BLM LIBRARY
88026121

U.S. Department of the Interior
Bureau of Land Management

# EAST SOCORRO

# Grazing Environmental Statement

Bureau of Land Management
Library
Denver Service Center

88026121

EAST
.18
DES

SF
85.35
.N6
E222
1979

BLM Library
D-553A, Building 50
Denver Federal Center
P. O. Box 25047
Denver, CO 80225-0047

DEPARTMENT OF THE INTERIOR

DRAFT

# ENVIRONMENTAL STATEMENT ON GRAZING MANAGEMENT IN THE EAST SOCORRO ES AREA

PREPARED BY

BUREAU OF LAND MANAGEMENT

DEPARTMENT OF THE INTERIOR

Arthur A. Zimmerman

STATE DIRECTOR, NEW MEXICO STATE OFFICE

Bureau of Land Management
Library
Denver Service Center

BLM Library
D-553A, Building 50
Denver Federal Center
P. O. Box 25047
Denver, CO 80225-0047

Bureau of Land Management
Library
Denver Service Center

SUMMARY

Draft (x) Final ( ) Environmental Statement

1. Type of Action: Administrative (x) Legislative ( )

2. Brief Description of Action: The Bureau of Land Management proposes to initiate an intensive livestock grazing program, (838,808 of public land) through the implementation of 79 allotment management plans (AMPs), on 91 allotments on 788,097 acres of public land; set livestock numbers on 26 non-AMP allotments on 46,142 acres public land; and maintain management of 4,569 acres of public land in no grazing areas in the Socorro District in Socorro and Valencia Counties, New Mexico. This proposal would impact intermingled State and private land within the 91 allotments which would have AMPs. Each AMP would establish the following for each allotment: (1) season of use for livestock, (2) proper livestock grazing use, (3) apportionment of wildlife and wild horse Animal Unit Months (AUMs), (4) allotment and pasture boundaries, and (5) proper grazing treatments.

Forage would be apportioned for livestock (119,465 AUMs), wildlife (4,802 AUMs), and wild horses (384 AUMs). Range developments would be constructed. Along proposed pipelines 48 fenced wildlife waters would be installed. Overall livestock adjustments would average -30 percent, while individual allotments would have a range of adjustments from +47 to -100 percent.

Purposes of the Proposed Action are to enhance the vegetative resource, improve range conditions, reduce erosion, improve water quality, provide quality habitat for wildlife and wild horses, protect archaeological and historical sites, and provide a continuous supply of livestock forage. These goals are taken into account in the development of each AMP.

Proposed grazing systems include rest-rotation for 38 allotments, deferred rotation for 6 allotments, rotational deferment for 14 allotments, rotational seasonal for 9 allotments, continuous seasonal for 8 allotments, and scheduled rest-best for 4 allotments. Fourteen wells and well facilities, 41 storage tanks, 79 troughs, 22 cattleguards, 4 springs, 1 earthen reservoir, 89 miles of pipelines, and 214 miles of fence would be required to implement the proposed grazing systems.

3. Summary of Environmental Impacts: After 20 years under the Proposed Action the existing situation would change as follows: Annual vegetative production (in AUMs) would increase 37 percent to 184,884; annual sediment yield (in acre-feet) would decrease 25 percent; annual runoff would decrease 3 percent; annual livestock production (in Animal Units) would increase 2 percent to 20,529; annual wildlife forage apportioned (in AUMs) would increase 5 percent to 5,041; annual wild horse forage would be determined through a management plan; and annual direct income would increase 2 percent (to $2,552,837) above the existing situation. In order to achieve these benefits rested and deferred pastures would eliminate competition of livestock with wildlife and wild horses for available forage; this would be especially beneficial in big game spring and winter habitat areas. The grazing systems would improve vegetative production, density, cover, and wildlife habitat. Livestock AUMs would be adjusted initially to match the available forage, resulting in a short-term (5 years) loss of approximately 4,266 AUs, 15 jobs and $527,520 annually in lost income. In the short term 6 small operators would be eliminated and operation sizes would decrease as a result of the livestock reductions. In the long term (20 years) 4 of the above small operators would still be eliminated. Because of increased vegetative production and an overall improvement in range condition in the long term operation sizes would generally shift back to the present ranch size categories. All jobs lost would be regained in the long term and income would increase 2 percent above the existing situation. Adverse impacts would include reduced vegetative production on 559 acres over the short term due to construction of range developments. Vegetation around water developments would be lost and localized soil erosion on 178 acres would increase. Fences would create additional barriers to big game.

4. Alternatives Considered:
   a. No Action
   b. Livestock Adjustment
   c. Pasture Capacity Level
   d. Enhancement of Sensitive Resource Values
   e. No Grazing

5. Comments Have Been Requested From the Following: See attached.

6. Draft Statement Made Available to EPA and the Public:

Comments on the Draft ES will be requested from the following agencies and interest groups:

FEDERAL AGENCIES

U. S. DEPARTMENT OF AGRICULTURE

Agriucultural Stabilization and Conservation Service
Forest Service
Soil Conservation Service

ENVIRONMENTAL PROTECTION AGENCY

U. S. DEPARTMENT OF THE INTERIOR

Advisory Council on Historic Preservation
Bureau of Mines
Bureau of Reclamation
Fish and Wildlife Service
Heritage Conservation and Recreation Service
National Park Service
U. S. Geological Survey

U. S. DEPARTMENT OF THE ARMY

Corps of Engineers
White Sands Missile Range

LOCAL GOVERNMENTS

City of Socorro
Laguna Planning Commission
Pueblo de Acoma
Sierra County Commissioners
Socorro County Commissioners
The Navajo Nation
Torrance County Commissioners
Valencia County Commissioners
Village of Magdalena

ENVIRONMENTAL INTEREST GROUPS

Ada County Fish and Game League
American Horse Protection Association
Audubon Society
Center for Environmental Research
Central Clearinghouse
Central Rio Grande Soil and Water Conservation District
Friends of the Earth
International Society for the Protection of Mustangs and Burros
Jornada Resource Conservation and Development
National Council of Public Land Users
National Mustang Association
National Wildlife Federation
Natural Resources Defense Council
Nevada Outdoor Recreation Association
New Mexico Association of National Resource Conservation Districts
New Mexico Conservation Coordinating Council
New Mexico Ornithological Society
New Mexico Wilderness Study Committee
Oregon Environmental Council
Salado Soil and Water Conservation District
Sierra Club
Socorro Soil and Water Conservation District
Southwest New Mexico Resource Conservation and Development
Spanish Barb Wild Horse Research Farm
Spanish Mustang Registry
Wild Horse Organized Assistance
Wilderness Society

LIVESTOCK INTEREST GROUPS

New Mexico Farm and Livestock Bureau
New Mexico Cattle Growers
Public Lands Council
Sierra County Farm Bureau
West Central Grazing Permittees Association

NEW MEXICO STATE AGENCIES

Department of Game and Fish
Department of Natural Resources
Division of State Forestry
Environmental Improvement Division
Middle Rio Grande Conservancy District
Middle Rio Grande Council of Governments
New Mexico State Clearinghouse
New Mexico Office of the Governor
Southern Rio Grande Council of Governments
State Engineer's Office
State Highway Department
State Historic Preservation Office
State Land Office
State Planning Office

PROFESSIONAL SOCIETIES

Society for Range Management
Soil Conservation Society of America
The Wildlife Society

OTHER GROUPS

Arizona State University
Eastern New Mexico University
Museum of New Mexico
Navajo Tribal Museum
New Mexico State University
School of American Research
University of New Mexico

INDIVIDUALS

James Morgan
Jerry Schickedanz
Livestock Permittees

TABLE OF CONTENTS


| | Page |
|---|---|
| Summary | i |
| 1. Description Of The Proposed Action and Alternatives | 1-1 |
| Description of the Proposed Action | 1-1 |
| Description of the Alternatives | 1-14 |
| No Action | 1-14 |
| Livestock Adjustment | 1-14 |
| Management at Pasture Capacity Level | 1-14 |
| Enhancement of Sensitive Resource Values | 1-16 |
| No Grazing | 1-22 |
| 2. Resource Analysis | 2-1 |
| Introduction | 2-1 |
| Physical Setting | 2-2 |
| Existing Environment | 2-2 |
| Vegetation | 2-5 |
| Existing Environment | 2-5 |
| Future Environment | 2-28 |
| Impacts | 2-28 |
| Unavoidable Adverse Impacts | 2-37 |
| Soils | 2-37 |
| Existing Environment | 2-37 |
| Future Environment | 2-56 |
| Impacts | 2-56 |
| Irreversible and Irretrievable | 2-62 |
| Water Resources | 2-63 |
| Existing Environment | 2-63 |
| Future Environment | 2-72 |
| Impacts | 2-72 |
| Livestock Grazing | 2-77 |
| Existing Environment | 2-77 |
| Future Environment | 2-77 |
| Impacts | 2-77 |
| Socio-Economics | 2-81 |
| Existing Environment | 2-81 |
| Future Environment | 2-87 |
| Impacts | 2-87 |
| Unavoidable Adverse Impacts | 2-97 |
| Wildlife | 2-98 |
| Existing Environment | 2-98 |
| Future Environment | 2-105 |
| Impacts | 2-105 |
| Unavoidable Adverse Impacts | 2-112 |
| Wild Horses | 2-112 |
| Existing Environment | 2-112 |
| Future Environment | 2-115 |
| Impacts | 2-115 |

TABLE OF CONTENTS (continued)


| | Page |
|---|---|
| Cultural Resources | 2-119 |
| Existing Environment | 2-119 |
| Future Environment | 2-123 |
| Impacts | 2-123 |
| Mitigating Measures | 2-125 |
| Unavoidable Adverse Impacts | 2-125 |
| Irreversible and Irretrievable | 2-125 |
| Recreation | 2-125 |
| Existing Environment | 2-125 |
| Future Environment | 2-131 |
| Impacts | 2-131 |
| Unavoidable Adverse Impacts | 2-133 |
| Visual Resources | 2-133 |
| Existing Environment | 2-133 |
| Future Environment | 2-137 |
| Impacts | 2-137 |
| Unavoidable Adverse Impacts | 2-145 |
| Irreversible and Irretrievable | 2-145 |
| Wilderness | 2-145 |
| Existing Environment | 2-145 |
| Future Environment | 2-145 |
| Impacts | 2-145 |
| 3. The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity | 3-1 |
| 4. Consultation and Coordination | 4-1 |
| Appendices | |
| Appendix 1 - Proposed Action | A-1 |
| Appendix 2 - Vegetation | A-38 |
| Appendix 3 - Soils | A-60 |
| Appendix 4 - Water Resources | A-78 |
| Appendix 5 - Livestock Grazing | A-83 |
| Appendix 6 - Socio-Economics | A-88 |
| Appendix 7 - Recreation | A-104 |
| Appendix 8 - Visual Resources | A-106 |
| Appendix 9 - Wilderness | A-116 |
| Appendix 10- The Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity | A-117 |
| Glossary | G-1 |
| References | R-1 |

LIST OF TABLES


| Table | Title | Page |
|---|---|---|
| 1-1 | Summary of Proposed Action by Grazing System | 1-3 |
| 1-2 | Summary of Livestock Adjustments | 1-4 |
| 1-3 | Summary of AMP Implementation Schedule | 1-6 |
| 1-4 | Proposed Range Developments and Acreage Disturbed by Construction | 1-8 |
| 1-5 | Summary of Key Elements for the Proposed Action and Alternatives | 1-15 |
| 1-6 | Summary of the Enhancement of Sensitive Resource Values Alternative | 1-17 |
| 2-1 | Summary of Impacts | 2-3 |
| 2-2 | Responses of Vegetation to the Proposed Action and Alternatives (Long Term) | 2-7 |
| 2-3 | Occurrence of Key Species in Ten Vegetative Types and Their Relationship to Sixteen Ranges | 2-21 |
| 2-4 | Seven Unique Riparian Areas | 2-24 |
| 2-5 | Proposed Threatened or Endangered Plant Species in ES Area | 2-25 |
| 2-6 | Summary of Range Condition Classes for the Long Term | 2-27 |
| 2-7 | The Proposed Action Would Cause the Key Species to Increase | 2-31 |
| 2-8 | Physical Parameters of Soils | 2-38 |
| 2-9 | Sediment Yield by Range Site | 2-53 |
| 2-10 | Comparison of Sediment Yield Classes by Range Site | 2-57 |
| 2-11 | Percent Sediment Yield Reduction by Range Sites in the Long Term | 2-60 |
| 2-12 | Physical Parameters of Representative Watersheds | 2-66 |
| 2-13 | A Comparison of Runoff Estimates for Representative Watersheds | 2-67 |
| 2-14 | A Comparison of Infiltration Rates | 2-69 |
| 2-15 | Recommended Water Quality Criteria for Livestock and Wildlife Use | 2-71 |
| 2-16 | State of New Mexico Water Quality Standards for Surface Waters in ES Area | 2-73 |
| 2-17 | Water Quality Criteria for Human Consumption | 2-74 |
| 2-18 | A Comparison of Groundwater Withdrawal for Livestock and Wildlife Watering | 2-74 |
| 2-19 | Summary of Operations and Livestock Numbers | 2-78 |
| 2-20 | Land Ownership, 1975-77 | 2-84 |
| 2-21 | Income by Industrial Sector | 2-84 |
| 2-22 | Estimated Non-Farm Jobs and Non-Farm Income of Ranch Families by Sizes of Ranches, 1975 | 2-85 |
| 2-23 | Estimated Average Employment, Wage Rates, and Labor Costs in One Year by Ranch Size, 1977 | 2-86 |
| 2-24 | Direct and Indirect Income from the Range Livestock Industry | 2-88 |

LIST OF TABLES (continued)


| Table | Title | Page |
|---|---|---|
| 2-25 | Permit Value by Ranch Size Category | 2-89 |
| 2-26 | Operators by Ranch Size Category in the Short and Long Terms | 2-90 |
| 2-27 | Summary of Income (Dollars) by Ranch Size Category | 2-92 |
| 2-28 | Deer and Antelope Numbers, AUMs, and Acres of Rested Habitat | 2-101 |
| 2-29 | Endangered Animal Species | 2-104 |
| 2-30 | Wild Horse Food Habits | 2-113 |
| 2-31 | Forage Distribution of Short- and Long-Term Predictions for the Wild Horse Management Area | 2-116 |
| 2-32 | Allotments in High Site Density Areas | 2-121 |
| 2-33 | Causes Affecting the Condition of Sites | 2-121 |
| 2-34 | Acres of Sediment Yield Classes in High Site Density Areas | 2-122 |
| 2-35 | Existing and Projected Recreation Use | 2-130 |
| 2-36 | Visual Resource Management Classes | 2-134 |
| 2-37 | Public Land Acreage in Visual Resource Classes | 2-136 |
| 2-38 | Existing Range Developments Associated with 100 Years of Livestock Grazing | 2-141 |
| 2-39 | Impacts by Visual Resource Classes | 2-142 |
| 2-40 | Summary of Visual Resource Impacts | 2-144 |
| 3-1 | Total Production for 20 Years and Changes in Long-Term Productivity | 3-2 |
| 3-2 | Trade-Offs Under the Proposed Action and Alternatives for the 20-Year, Short-Term Use Period | 3-3 |
| A-1 | Proposed Action | A-1 |
| A-2 | Proposed Range Development and AMP Implementation Schedule | A-18 |
| A-3 | Planning System Interrelationships | A-24 |
| A-4 | Scientific Name Equivalents for Common Names of Plants Used in the Text and Captions | A-38 |
| A-5 | Physical Characteristics of Four MLRAs | A-40 |
| A-6 | Existing Range Condition of Allotments | A-41 |
| A-7 | Prediction of Range Condition | A-44 |
| A-8 | Example of How the Weighted Proper Use Factor Was Calculated for the Sandy (SD) Range Site | A-45 |
| A-9 | Potential Productivities of Range Sites | A-46 |
| A-10 | Vegetative Production When Livestock Use is Reduced from Heavy to Moderate | A-50 |
| A-11 | Vegetative Production when Grazing Systems are Implemented on Rangelands that Have Previously Been Grazed Continuously with a Moderate or Proper Stocking Rate | A-50 |
| A-12 | Density and Cover Values when Grazing Is Reduced from Heavy to Moderate Use | A-51 |
| A-13 | Density and Cover Values when Grazing Systems Are Implemented on Rangelands that Have Previously Been Grazed Continuously with a Moderate or Proper Stocking Rate | A-51 |

LIST OF TABLES (continued)


| Table | Title | Page |
|---|---|---|
| A-14 | Vegetative Production when Livestock Use was Reduced from Moderate to Light | A-52 |
| A-15 | Density and Cover Values when Grazing is Reduced from Moderate to Light Use | A-52 |
| A-16 | Vegetative Production when Livestock are Removed from a Previously Moderately Grazed Range | A-57 |
| A-17 | Density and Cover Values when Livestock are Removed from a Previously Moderately Grazed Range | A-57 |
| A-18 | Vegetative AUMs in the Long Term | A-58 |
| A-19 | Soils and Range Sites by Allotment | A-60 |
| A-20 | Percent Cover and PSIAC Factor Rating for Cover* for Soil Erosion Calculations by Range Site | A-75 |
| A-21 | PSIAC Conversion Factors | A-77 |
| A-22 | SCS, Modified SCS, FHWA, and Log-Pearson Type III Flows on Canada Montosa | A-78 |
| A-23 | Soil Vegetative Cover Complexes | A-82 |
| A-24 | Ranch Size and Use Levels for Existing, Proposed Action, and Alternatives | A-83 |
| A-25 | Grazing Dependency by Ranch Category, 1975 | A-88 |
| A-26 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Existing Environment | A-92 |
| A-27 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for the Proposed Action and Livestock Adjustment Alternative in the Short Term | A-93 |
| A-28 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Action Alternative in the Short Term | A-94 |
| A-29 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Pasture Capacity Level Alternative in the Short Term | A-95 |
| A-30 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for the Enhancement of Sensitive Resource Values Alternative in the Short Term | A-96 |
| A-31 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Grazing Alternative in the Short Term | A-97 |
| A-32 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Proposed Action in the Long Term | A-98 |
| A-33 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Action Alternative in the Long Term | A-99 |
| A-34 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Livestock Adjustment Alternative in the Long Term | A-100 |
| A-35 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Pasture Capacity Level Alternative in the Long Term | A-101 |

LIST OF TABLES (continued)


| Table | Title | Page |
|---|---|---|
| A-36 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Enhancement of Sensitive Resource Values Alternative in the Long Term ..... | A-102 |
| A-37 | Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Grazing Alternative in the Long Term ..... | A-103 |
| A-38 | Methodology for Determination of Estimated Recreation Use ..... | A-105 |
| A-39 | Visual Resource Contrast Ratings of Typical Range Developments ..... | A-110 |
| A-40 | Acres per Visual Resource Management Class (by Allotment) ..... | A-113 |
| A-41 | 58 Allotments in Roadless Areas ..... | A-116 |

LIST OF ILLUSTRATIONS


| Figures | Title | Page |
|---|---|---|
| 2-1 | Juniper and Blue Grama Characterize the Pinyon-Juniper Type | 2-14 |
| 2-2 | Black Grama Characterizes a Gravelly Range Site in the Grass Type | 2-14 |
| 2-3 | Alkali Sacaton Characterizes a Bottomland Range Site in the Grass Type | 2-16 |
| 2-4 | The Bosque Riparian Vegetative Type Occurs Along the Rio Grande | 2-16 |
| 2-5 | Creosote Characterizes a Gravelly Range Site in the SD MLRA | 2-18 |
| 2-6 | Four-Wing Saltbush Dominates the Saltbush Type on Loamy Sites in the WP-2 and WP-3 MLRAs | 2-18 |
| 2-7 | Mesquite Characterizes the Mesquite Type on a Poor Condition Sandy Range Site | 2-19 |
| 2-8 | Sand Sagebrush Characterizes the Sagebrush Type | 2-19 |
| 2-9 | Cholla Dominates Most of the Desert Shrub Type | 2-23 |
| 2-10 | Phenological Development for Key Species | 2-22 |
| 2-11 | Ponia Creek Is a Unique Riparian Area | 2-23 |
| 2-12 | Creosote Terraces | 2-127 |
| 2-13 | Grasslands | 2-127 |
| 2-14 | Mesa Mountain Topography | 2-128 |
| 2-15 | Scenic Yucca Area | 2-128 |
| 2-16 | Ladron Mountain, Class I | 2-138 |
| 2-17 | Tecolote Badlands, Class II | 2-138 |
| 2-18 | Coarse Texture/Broken Line, Class III | 2-139 |
| 2-19 | Jornada del Muerto, Class IV | 2-139 |
| 2-20 | Intrusions - Powerlines, Class V | 2-140 |
| 2-21 | Intrusions Associated with Grazing | 2-140 |
| A-1 | Record of Pace Transect | A-10 |
| A-2 | Form 7310-12 | A-11 |
| A-3 | Form 4412-1 | A-12 |
| A-4 | Summary of Range Survey by Allotment | A-13 |
| A-5 | Range Suitability Standards | A-14 |
| A-6 | Examples of the Proposed Six Typical Grazing Systems | A-17 |
| A-7 | Comparison of "Range Site Guide" to "Range Type Writeups in Determining Range Condition" | A-43 |
| A-8 | An Example of Factors Affecting a High, Moderate, and Low Sediment Yield in the Pacific Southwest | A-76 |
| A-9 | Method for Estimating a Site Specific Curve Number for a Small Watershed | A-80 |
| A-10 | SCS Method for Calculating Peak Discharge from Small Ungaged Watersheds | A-81 |
| A-11 | Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Proposed Action | A-89 |

LIST OF ILLUSTRATIONS (continued)


| Figures | Title | Page |
|---|---|---|
| A-12 | Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the No Action Alternative ..... | A-89 |
| A-13 | Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Livestock Adjustment Alternative ..... | A-90 |
| A-14 | Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Pasture Capacity Level Alternative ..... | A-90 |
| A-15 | Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Enhancement of Sensitive Resource Values Alternative ..... | A-91 |
| A-16 | Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the No Grazing Alternative ..... | A-91 |
| A-17 | Scenery Quality Inventory Chart ..... | A-107 |
| A-18 | Visual Resource Class Determination Matrix ..... | A-108 |
| A-19 | Simplified Response Curve Showing Annual Production ..... | A-118 |

## LIST OF MAPS


| Map | Title | Page |
|---|---|---|
| 1-1 | East Socorro Grazing Environmental Statement Area ..... | 1-2 |
| 2-1 | Average Annual Precipitation ..... | 2-4 |
| 2-2 | Major Land Resource Areas ..... | 2-6 |
| 2-3 | Range Condition Classes ..... | 2-26 |
| 2-4 | Sediment Yield Classes ..... | 2-55 |
| 2-5 | Drainage Basins, Representative Watersheds, and Hydrologic Units ..... | 2-65 |
| 2-6 | Socio-Economic Impact Area ..... | 2-82 |
| 2-7 | Deer Distribution ..... | 2-99 |
| 2-8 | Antelope Distribution ..... | 2-100 |
| 2-9 | Wild Horse Management Area in the Bordo Atravesado Allotment (254) ..... | 2-114 |
| 2-10 | Cultural Resources ..... | 2-120 |
| 2-11 | Area of Comparison for Scenic Quality Evaluations ..... | 2-126 |
| 2-12 | Scenic Geologic Resources and ORV Use Area ..... | 2-129 |
| 2-13 | Visual Resource Management Classes ..... | 2-135 |


## VISUALS


A. Land Status and Proposed Allotments
B. Vegetation
C. Soils
D. Existing and Proposed Developments

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES 1

RESOURCE ANALYSIS 2

THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY 3

CONSULTATION AND COORDINATION 4

APPENDICES A

GLOSSARY G

REFERENCES R

# CHAPTER 1

## DESCRIPTION OF THE PROPOSED ACTION AND ALTERNATIVES

## DESCRIPTION OF THE PROPOSED ACTION

### PURPOSE AND OBJECTIVES

The purpose of the Proposed Action is to implement a grazing management program based on growth requirements of vegetation. Objectives (for a 20-year period) are to enhance the vegetative resource, improve range conditions, reduce erosion and sedimentation damage, improve water quality, provide quality habitat for wildlife and wild horses, improve the recreation and visual resources, provide a continuous supply of livestock forage, and protect archaeological and historical sites. These objectives are taken into account in the development of each Allotment Management Plan (AMP). Each AMP may be reviewed at the Bureau of Land Management (BLM) Socorro District Office.

### SETTING AND LAND STATUS

The Environmental Statement (ES) Area is irregularly shaped and ranges basically northwest and east from the town of Socorro (estimated population 6,000). The area, divided by the Rio Grande, extends as much as 100 miles from north to south and 50 miles from east to west (Map 1-1). Elevations range from 4,500 feet on the lower Rio Grande to 9,176 feet on Ladron Peak. The higher elevations are semiarid while the lower elevations are arid. There is little dependable surface water.

The ES Area is bounded on the south by the White Sands Missile Range, Bosque del Apache National Wildlife Refuge, and Sierra County; it is bounded on the north by the Sevilleta National Wildlife Refuge and the Acoma and Laguna Indian Reservations. The Cibola National Forest and D-Cross Mountain denote the western boundary, and the eastern line runs near Chupadera Mesa. Adjacent communities include Socorro, Magdalena, Belen, and Los Lunas.

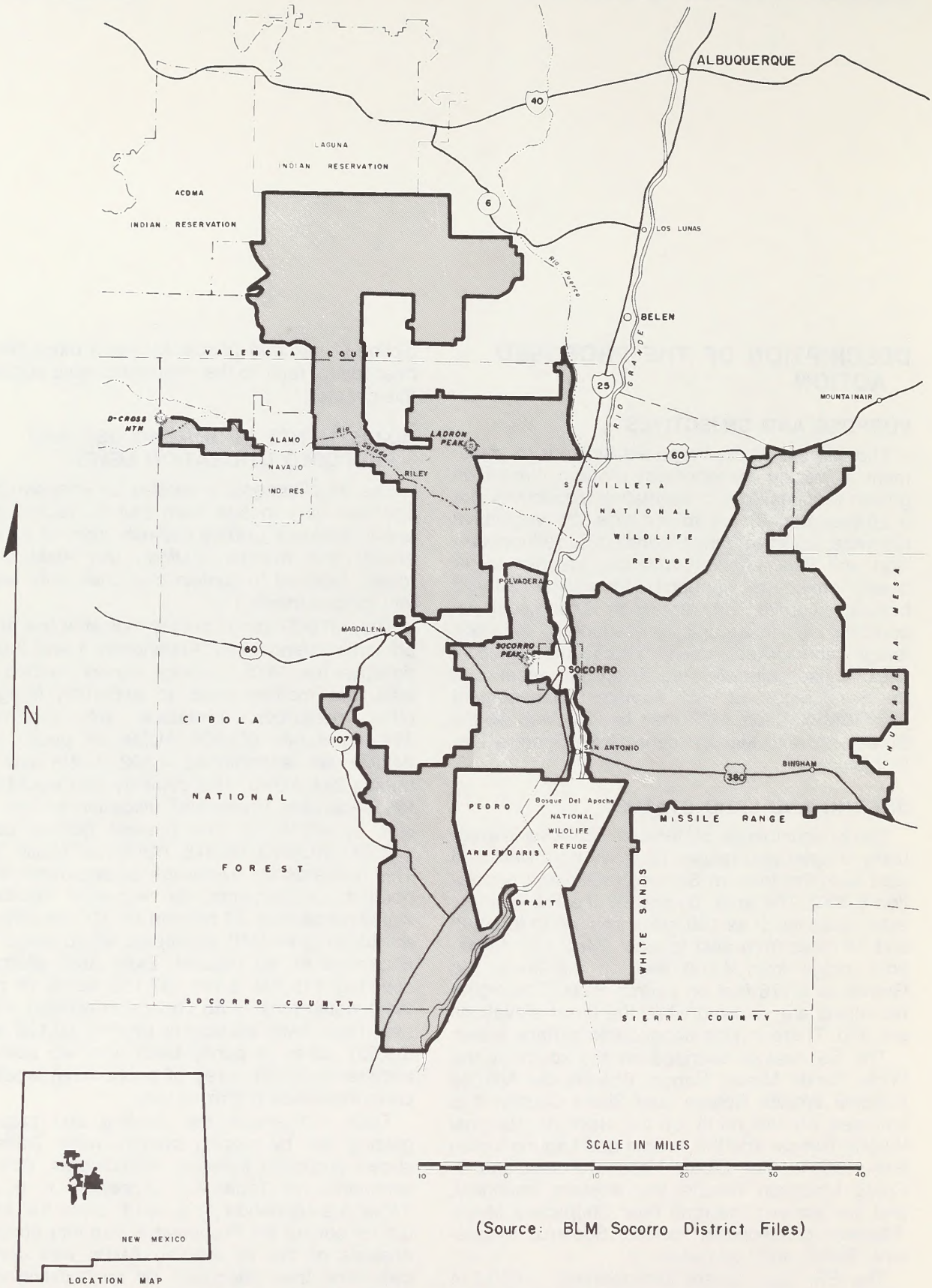
The ES Area covers approximately 1,650,214 acres; 838,808 acres (51 percent) is public land, 293,158 acres is State land (18 percent), 495,196 acres is private land (30 percent), and 23,052 acres is under Bureau of Reclamation (BR) jurisdiction (1 percent) (Visual A). For a more detailed description, refer to the Interrelationship section of this chapter.

### ADJUSTMENTS IN GRAZING USE AND PROPOSED UTILIZATION LEVEL

The 91 allotments proposed for intensive management vary in size from 584 to 73,224 acres and in livestock grazing capacity from 17 to 7,649 animal unit months (AUMs). (An AUM is the forage required to sustain one cow or its equivalent for one month.)

The 1975-77 range survey indicates the area is presently overstocked. Appendices 1 and 2 briefly describe the 1975-77 range survey method and, also, the method used to apportion forage to other resources. Livestock are apportioned 119,465 AUMs (71,600 AUMs on public land). Wildlife are apportioned 4,802 AUMs and wild horses 384 AUMs. This capacity rate would allow for 50-percent (moderate) utilization of key species by allotment. The present grazing use is 170,697 AUMs (104,678 AUMs on public land). This indicates an overusage of approximately 30 percent. Adjustments for non-AMP allotments would range from 47 percent to -100 percent. The adjustments in AMP allotments would range from 6 percent to -80 percent. Eight AMP allotments covering 115,994 acres (97,153 acres of public land) would receive no change in existing grazing use. Four AMP allotments totaling 60,196 acres (38,827 acres of public land) and two non-AMP allotments (8,039 acres of public land) would receive increases in grazing use.

Table 1-1 shows the existing and proposed grazing use by grazing system, while Table 1-2 shows proposed livestock adjustments. Both are summaries of Table A-1 (Appendix 1, p. A-1). Table A-2 (Appendix 1, p. A-18) gives the schedule for putting the Proposed Action into effect. An analysis of the 25 existing AMPs was done to determine their adequacy. Of the existing AMPs six would remain unchanged, eleven would have adjustments in FY 1980, and eight would have both adjustments and developments in FY 1980. The unsuccessful AMPs were either overstocked,




(Source: BLM Socorro District Files)

**MAP 1-1.** East Socorro Grazing Environmental Statement Area

TABLE 1-1

SUMMARY OF PROPOSED ACTION BY GRAZING SYSTEM

| Allotments | Type of Grazing System /3 | Number | Acres | Existing Grazing Use (In AUMs) Livestock | Existing Grazing Use (In AUMs) Wildlife | Proposed Grazing Use (In AUMs) Livestock | Proposed Grazing Use (In AUMs) Wildlife |
|---|---|---|---|---|---|---|---|
| AMPs | RR-2 | 2 | 27,858 | 2,929 | 0 | 191 | 46 |
| | RR-3 | 20 | 359,969 | 50,070 | 433 | 32,939 | 1,049 |
| | RR-4 | 11 | 188,251 | 27,472 | 419 | 17,219 | 795 |
| | RR-5 | 3 | 122,720 | 15,161 | 159 | 12,924 | 322 |
| | RR-6 | 1 | 27,690 | 3,228 | 144 | 1,762 | 110 |
| | RR-8 | 1 | 30,118 | 2,705 | 0 | 2,705 | 79 |
| | RR-9 | 1 | 21,158 | 1,500 | 0 | 1,500 | 53 |
| | (Total RR) | (39) | (777,764) | (103,065) | (1,155) | (69,240) | (2,454) |
| | RB-3 | 1 | 73,224 | 12,384 | 300 | 7,649 | 470 |
| | RB-4 | 2 | 57,915 | 5,954 | 72 | 5,110 | 108 |
| | RB-5 | 1 | 46,573 | 6,899 | 12 | 4,640 | 178 |
| | (Total RB) | (4) | (177,712) | (25,237) | (384) | (17,399) | (756) |
| | RD-2 | 8 | 65,880 | 6,984 | 72 | 5,671 | 225 |
| | RO-3 | 5 | 76,539 | 9,963 | 66 | 9,787 | 433 |
| | (Total RO) | (13) | (142,419) | (16,947) | (138) | (15,458) | (658) |
| | CS-1 | 7 | 12,641 | 1,372 | 111 | 661 | 54 |
| | CS-2 | 1 | 21,165 | 2,720 | 0 | 1,230 | 91 |
| | (Total CS) | (8) | (33,806) | (4,092) | (111) | (1,891) | (145) |
| | RS-2 | 8 | 71,966 | 6,961 | 16 | 5,013 | 323 |
| | RS-4 | 1 | 33,092 | 3,636 | 24 | 2,831 | 65 |
| | (Total RS) | (9) | (105,058) | (10,597) | (40) | (7,844) | (388) |
| | OR-2 | 4 | 15,401 | 1,608 | 24 | 836 | 43 |
| | DR-3 | 2 | 15,276 | 1,699 | 0 | 1,436 | 113 |
| | (Total DR) | (6) | (30,677) | (3,355) | (24) | (2,272) | (156) |
| Totals | | 79 | 1,267,436 | 163,293 | 1,852 | 114,104 | 4,557 /1 |
| Non-AMPs | | 26 | 46,142 /2 | 7,292 | 51 | 5,361 | 201 |
| Elimination of Grazing | | 4 | 1,987 | 112 | 0 | 0 | 41 |
| Unallotted | | 2 | 2,582 | 0 | 0 | 0 | 3 |
| Grand Total | | 111 | 1,318,147 /4 | 170,697 | 1,903 | 119,465 | 4,802 |

/1 384 AUMs not included in this total is set aside for Wild Horses.
/2 Includes only public land on non-AMP areas.
/3 The 3 AMPs having more than one grazing system are listed under the system with the greatest number of AUMs. Numbers following abbreviations indicate the number of pastures in the grazing system.
/4 Does not include 332,067 acres of private and State land in non-AMP areas.

RR - Rest-Rotation
RB - Rest-Best
RO - Rotational Deferment
CS - Continuous Seasonal
DR - Deferred Rotational
RS - Rotational Seasonal

Source: Summary of Table A-1 (Appendix 1, p. A-1)

TABLE 1-2

SUMMARY OF LIVESTOCK ADJUSTMENTS

| ALLOTMENTS | TOTAL EXISTING GRAZING USE (AUMs) | NUMBER OF ALLOTMENTS BY PERCENT CHANGE GROUP (IN LIVESTOCK AUMS) | | | | | | | TOTAL |
|---|---|---|---|---|---|---|---|---|---|
| | | +1 to +47 | 0 | -1 to -15 | -16 to -30 | -31 to -50 | -51 to -90 | -91 to -100 | |
| Number of AMPs | | 4 | 8 | 11 | 17 | 20 | 19 | 0 | 79 |
| (AUMs) | (163,293) | (9,737) | (12,153) | (19,458) | (27,445) | (34,070) | (11,241) | (0) | (114,104) |
| Number of Non-AMPs | | 2 | 0 | 2 | 5 | 9 | 6 | 2 | 26 |
| (AUMs) | (7,292) | (1,268) | (0) | (533) | (1,668) | (1,523) | (369) | (0) | (5,361) |
| Number of Elimination of Grazing | | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 4 |
| (AUMs) | (112) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
| Number of Unallotted Areas | | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| (AUMs) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) | (0) |
| Total | | 6 | 10 | 13 | 22 | 29 | 25 | 6 | 111 |
| (AUMs) | (170,697) | (11,005) | (12,153) | (19,991) | (29,113) | (35,593) | (11,610) | (0) | (119,465) |

Source: Summary of Table A-1 (Appendix 1, p. A-1)

the systems were not meeting resource objectives, and/or the systems were never implemented because of a lack of range developments to fully implement them. Proposed AMPs would have their adjustments completed as follows: 17 in FY 1981, 16 in FY 1982, and 21 in FY 1983 (Table 1-3).

Grazing use would be set at the 1975-77 range survey level. Adjustments would be initiated during the first fiscal year following completion of the final ES. In an effort to reduce probable hardship livestock adjustments would be applied as follows:

1. Reductions of 15 percent or less and all increases would become effective the first year.
2. Reductions of 16 to 30 percent would be taken in two equal portions over 2 years.
3. Reductions of 31 percent or more would be in three equal portions over 3 years.

Apportionment of the predicted vegetative increases must be done through the BLM Planning Systems. The projected increases in vegetation would be distributed through guidelines set during the next update of the Management Framework Plan (MFP). Increases in vegetative production would be apportioned based on the needs of all the resources.

## ALLOTMENT MANAGEMENT PLAN AREAS

Seventy-nine (79) AMPs would be implemented on 91 allotments with the Proposed Action (Visual A). These allotments include a total of 1,267,436 acres. These AMPs contain the grazing systems most suitable to a given allotment. Thus, they prescribe the conditions, manner, and extent of livestock grazing and describe type, location, ownership, and general installation and maintenance specifications for range developments (Federal Land Policy and Management Act, 1976). AMPs may be reviewed in the BLM Socorro District Office.

### *Grazing Systems*

A Grazing system is the manipulation of animals to accomplish a desired result. The systems aim at improving 1) forage production which can be increased by changing botanical composition, increasing vigor, and stimulating growth, and 2) livestock production and performance which can be achieved without site deterioration by obtaining better livestock distribution (Cook, 1966; Shiflet and Heady, 1977; and Heady, 1961).

Various systems have been developed that are geared to the growth requirements of forage in specific areas. Periodic rest from grazing is usually provided through pasture rotation to permit plants to regain vigor, produce seed, reproduce vegetatively through seed dissemination and seedling establishment, and to allow for litter accumulation to protect the soil surface. Typical schematics for each of the proposed grazing systems are in Appendix 1 (Figure A-6, p. A-17).

Six grazing systems tailored to specific conditions are proposed in the ES Area. They are as follows:

1. Systems Allowing Grazing on Allotment Year-Round

Rest-Rotation -- One or more pastures are usually rested yearlong on a rotational schedule. Another pasture often is scheduled for rest during the growing season, July through October. Yearlong rest allows plants the opportunity to regain vigor, produce seed, and reproduce through seed dissemination and seedling establishment. Yearlong rest allows litter to accumulate (Hormay, 1970).

This type of system was proposed on allotments where browse species such as mountain mahogany, saltbush, and winterfat are key species. It was also proposed on allotments where black grama is the more important key grass species. Also, where cool season species have been depleted and where key species vigor needs improvement, rest-rotation systems were proposed.

This system would allow browse the 16-month rest period that they need to improve vigor and complete their reproductive cycle. Black grama, which reproduces mainly vegetatively, would be afforded the opportunity to complete its reproduction cycle during the 16-month rest period. Stolons would be produced one growing season; the winter rest would leave the stolons undisturbed; then the rest period the following growing season would allow the stolons to take root and become firmly established.

The type of rest-rotation systems proposed also allows for rest and seed production by cool season species. Also, where plant vigor is low, the rest periods proposed will allow the key species to produce and store food; therefore, improving the general health or vigor of these species. Rest-rotation systems are proposed for 39 allotments including 777,764 acres.

Scheduled Rest-Best -- One or more pastures are rested yearlong on a flexible rotation basis rather than on a fixed rest schedule. The system is flexible in that the rancher and BLM mutually select and agree on which pastures are to be rested.

This system was selected for allotments where the same conditions as previously discussed under rest-rotation systems exist. In addition to the reasons discussed, the scheduled rest-best system was proposed for large and very large allotments that have topographic features that create different moisture - vegetative conditions.

TABLE 1-3

SUMMARY OF AMP IMPLEMENTATION SCHEDULE

| | FY 80 | | | FY 81 | | | FY 82 | | | FY 83 | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Allot. | AUMs | Acres | Allot. | AUMs | Acres | Allot. | AUMs | Acres | Allot. | AUMs | Acres |
| | 036 1/ | 1,200 | 12,096 | 006 5/ | 1,478 | 13,731 | 012 5/ | 65 | 2,729 | 002 5/ | 2,632 | 48,523 |
| | 058 2/ | 534 | 4,577 | 016 5/ | 2,254 | 25,837 | 114 5/ | 4,640 | 46,573 | 037 5/ | 1,352 | 14,076 |
| | 059 2/ | 1,762 | 27,690 | 083 4/ | 64 | 634 | 152 5/ | 2,856 | 32,078 | 052 4/ | 78 | 2,096 |
| | 065 3/ | 2,831 | 33,092 | 086 4/ | 2,832 | 27,882 | 251 5/ | 2,295 | 17,196 | 089 4/ | 43 | 644 |
| | 077 2/ | 191 | 6,573 | 258 5/ | 965 | 12,871 | 252 5/ | 1,684 | 21,285 | 090 4/ | 959 | 13,899 |
| | 081 1/ | 948 | 6,189 | 263 5/ | 1,893 | 21,600 | 262 5/ | 2,105 | 23,399 | 131 5/ | 814 | 10,940 |
| | 091 2/ | 478 | 7,474 | 264 5/ | 1,146 | 10,640 | 266 5/ | 1,282 | 13,517 | 250 5/ | 515 | 17,970 |
| | 121 3/ | 848 | 9,708 | 272 5/ | 4,206 | 22,622 | 271 5/ | 2,816 | 20,155 | 260 5/ | 1,678 | 18,395 |
| | 122 2/ | 310 | 5,417 | 285 5/ | 2,226 | 27,875 | 276 4/ | 310 | 3,040 | 268 5/ | 2,529 | 35,895 |
| | 129 3/ | 6,340 | 72,345 | 290 5/ | 2,287 | 12,726 | 277 4/ | 1,691 | 26,692 | 275 5/ | 7,649 | 73,224 |
| | 253 2/ | 204 | 3,117 | 293 5/ | 6,106 | 42,901 | 291 5/ | 1,199 | 10,626 | 280 5/ | 1,518 | 18,029 |
| | 254 3/ | 1,764 | 25,163 | 294 4/ | 1,332 | 11,531 | 303 5/ | 78 | 707 | 284 5/ | 1,050 | 11,662 |
| | 255 3/ | 284 | 6,127 | 299 5/ | 413 | 12,934 | 330 5/ | 940 | 8,124 | 295 4/ | 1,230 | 21,165 |
| | 256 2/ | 1,474 | 15,787 | 322 5/ | 1,900 | 17,566 | 347 4/ | 17 | 584 | 298 5/ | 801 | 7,516 |
| | 261 1/ | 2,705 | 30,118 | 323 4/ | 1,912 | 13,317 | 348 5/ | 146 | 2,358 | 301 5/ | 3,559 | 31,703 |
| | 279 1/ | 1,500 | 21,158 | 328 5/ | 1,013 | 6,410 | 349 5/ | 81 | 1,315 | 306 5/ | 244 | 6,160 |
| | 283 3/ | 1,740 | 22,860 | 360 4/ | 628 | 4,382 | | | | 308 5/ | 161 | 5,527 |
| | 287 2/ | 186 | 5,114 | | | | | | | 315 4/ | 68 | 4,328 |
| | 288 3/ | 241 | 5,302 | | | | | | | 321 4/ | 843 | 11,573 |
| | 289 1/ | 1,620 | 10,670 | | | | | | | 325 5/ | 1,485 | 13,866 |
| | 297 2/ | 452 | 19,996 | | | | | | | 327 5/ | 971 | 11,813 |
| | 300 1/ | 720 | 3,499 | | | | | | | | | |
| | 312 3/ | 337 | 9,450 | | | | | | | | | |
| | 317 2/ | 104 | 3,745 | | | | | | | | | |
| | 318 2/ | 292 | 5,328 | | | | | | | | | |
| Total AUMs (114,104) | | 29,065 | | | 32,655 | | | 22,205 | | | 30,179 | |
| Total Acres (1,267,436) | | | 372,595 | | | 285,459 | | | 230,378 | | | 379,004 |
| Number of Allotments (79) | 25 | | | 17 | | | 16 | | | 21 | | |

1/ Existing AMPs without Adjustments or Developments
2/ Existing AMPs with Adjustments Only
3/ Existing AMPs with Adjustments and Developments
4/ Proposed AMPs with Adjustments Only
5/ Proposed AMPs with Adjustments and Developments

Source: Summary of Tables A-1 (Appendix 1, p. A-1), A-2 (Appendix 1, p. A-18)

This system is very compatible with Valentine's (1967) 'seasonal suitability' and Herbel, Steger, and Gould (1974), and Herbel's (1971) 'best pasture' system, which is the grazing system supported by research from the Jornada Experimental Range. This system is proposed on 4 allotments totaling 177,712 acres.

Rotational Deferment -- Every pasture is grazed once or twice annually with each pasture receiving a full growing season rest on a rotational basis. Rest during growing seasons is rotated among pastures, and the system is quite similar to deferred rotation. This system was proposed on allotments where additional expenditures beyond what is in the Proposed Action for range developments would not be cost effective through a benefit/cost analysis. This system provides rest during the growing season, and allows for breaking up a pattern of continuous use. Although longer rest periods would have been desirable, these rest periods do provide for rest to improve vigor on smaller allotments where resource values are not critical and the benefit/cost limits pasture numbers. This system is proposed on 13 allotments totaling 142,419 acres.

Deferred Rotation -- Every pasture is grazed once or twice annually with each pasture receiving a partial, deferred growing season rest. This system was proposed on allotments where additional expenditures beyond what is in the Proposed Action for range developments would not be cost effective through a benefit/cost analysis. This system provides a partial growing season rest which will allow for a breaking up of continuous yearlong use. This system is very similar to the rotational deferment systems proposed; however, the smaller size of the allotments this system was proposed for limited the rest period that could be provided. This system is proposed on 6 allotments totaling 30,677 acres.

2. Systems Restricting Grazing on an Allotment to a Specific Season

Rotational Seasonal -- One pasture is used during a season of the year while the other pasture is rested for up to 16 months. These small two-pasture allotments generally have less than ideal plant specie composition and cover. Black grama, the most important forage plant, is generally low in vigor and only remote stands are present. In order to improve these conditions a long rest period (16 months) is needed to allow black grama to produce stolons and reproduce vegetatively. The rotational seasonal system was proposed on 9 allotments totaling 105,058 acres because it provided the needed 16-month rest period as well as rest for improved plant vigor. Three of these allotments are presently being grazed seasonally.

Continuous Seasonal -- The allotment is used during a specified season. The systems proposed do not allow the allotment to be grazed for more than two successive growing seasons. This system takes into account special resource values or problems on generally small allotments.

Some of the special resource needs or problems met through the implementation of this type of system on these allotments include: winter rest where needed to provide deer with a winter use area free from competition with livestock; winter use by livestock in a pasture that provides them some protection from the elements; use of a pasture by livestock during a season when water is available. This system is proposed on all or part of 8 allotments totaling 33,806 acres.

*Range Developments*

Construction of range developments would be required for the implementation of the proposed AMPs. These developments are: springs, pipelines, wells, fenced wildlife waters, troughs, fences, cattleguards, storage tanks, well facilities, and an earthen reservoir (Visual D).

All developments are designed by the BLM district engineer to fit the situation for the particular area; however, these are, for the most part, standard throughout BLM. The details of how the developments are constructed may be reviewed in the BLM Socorro District Office.

Developments related to this proposal are shown by allotment in Appendix 1 (Table A-2, p. A-18). A summary of these developments is found in Table 1-4.

Before any proposed development or action is implemented on public land, BLM must adhere to certain procedures and design specifications to protect all resources. This is mandated through certain laws, executive orders, and manual requirements.

*Project Design Features*

Design features for construction of the proposed range developments are as follows:

1. Roads or trails would be constructed only where existing roads and trails could not be used (BLM policy).
2. Archaeological clearance would be required for each project site before construction (BLM policy; National Historic Preservation Act of 1966; National Environmental Policy Act of 1969; Executive Order 11593; 36 CFR 800).
3. Threatened or Endangered species survey and clearance would be required for each project site before construction (Endangered Species Act and BLM Manual 6840).

TABLE 1-4

PROPOSED RANGE DEVELOPMENTS AND ACREAGE DISTURBED BY CONSTRUCTION /1

| | | PA/PCL | | | NA/FE/LA | | | ESR | | | NG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Range Developments | Units | Total Units | ST | LT | Total Units | ST | LT | Total Units | ST | LT | Total Units | ST | LT |
| Fences /2 | mi. | 214.2 | 214.2 | 42.8 | 13.8 | 13.8 | 2.76 | 241.2 | 241.0 | 48.2 | 1,475.0 | 1,475.0 | 295.0 |
| Cattleguards | ea. | 22.0 | 1.3 | 1.3 | 0 | 0 | 0 | 22.0 | 1.3 | 1.3 | 0 | 0 | 0 |
| Wells | ea. | 14.0 | 7.0 | 1.4 | 3.0 | 1.5 | 0.30 | 14.0 | 7.0 | 1.4 | 0 | 0 | 0 |
| Well Facilities | ea. | 14.0 | 0 | 0 | 3.0 | 0 | 0 | 14.0 | 0 | 0 | 0 | 0 | 0 |
| Springs | ea. | 4.0 | 0.8 | 0.2 | 1.0 | 0.2 | 0.05 | 4.0 | 0.8 | 0.2 | 0 | 0 | 0 |
| Pipelines /2 | mi. | 88.7 | 133.1 | 88.7 | 17.4 | 26.1 | 17.40 | 88.7 | 133.1 | 88.7 | 0 | 0 | 0 |
| Storage Tanks | ea. | 41.0 | 20.5 | 4.1 | 14.0 | 2.8 | 1.40 | 41.0 | 20.5 | 4.1 | 0 | 0 | 0 |
| Troughs /3 | ea. | 79.0 | 197.5 | 197.5 | 18.0 | 45.0 | 45.00 | 79.0 | 197.5 | 197.5 | 0 | 0 | 0 |
| Wildlife Waters/Fenced | ea. | 48.0 | 4.8 | 2.4 | 9.0 | 0.9 | 0.45 | 48.0 | 4.8 | 2.4 | 0 | 0 | 0 |
| Earthen Reservoirs | ea. | 1.0 | 1.0 | 0.5 | 0 | 0 | 0 | 1.0 | 1.0 | 0.5 | 0 | 0 | 0 |
| TOTAL | | | 580.2 | 338.9 | | 90.3 | 67.36 | | 607.0 | 344.3 | | 1,475.0 | 295.0 |

/1 Summary of Table A-2 (Appendix 1, p. A-18)

/2 Disturbance relating to fences and pipelines includes roads

/3 Disturbance relating to troughs includes sacrifice areas (2.5 acres per trough)

ST = Short Term (Five years or less)

LT = Long Term (Twenty years)

PA = Proposed Action
LA = Livestock Adjustment Alternative
NG = No Grazing Alternative

PCL = Pasture Capacity Level Alternative
ESR = Enhancement of Sensitive Resource Values Alternative

NA/FE = No Action Alternative and Future Environment

Source: Summary of Table A-2 (Appendix 1, p. A-18)

4. Disturbance of soil and vegetation at all project sites would be held to an absolute minimum (BLM policy; BLM Manual 6300).

5. Areas where the soils would be disturbed would be restored to blend into the surrounding soil surface (BLM policy; BLM Manual 6300).

6. Visual resources contrast ratings would be completed in the survey and design stage of all proposed developments (BLM policy; BLM Manual 6300), and appropriate mitigating measures would be implemented to meet the Visual Resource Management (VRM) class objectives for the area in which the action is located.

7. All storage tanks would be buried when feasible.

8. Soil maps and the watershed specialist would be consulted for on-site investigations to determine areas of least impact, i.e., avoid soils on steep slopes and soils in the critical and severe erosion condition classes.

9. Construction of all fences would be in accordance with design constraints in BLM Manual 1737.

10. Water would be provided in rested pastures for wildlife and wild horse use in accordance with BLM policy.

11. No action would be taken in roadless areas determined to have wilderness characteristics until the complete wilderness inventory and study required by Section 603 of the Federal Land Policy and Management Act of 1976 (FLPMA) is completed and Congress has acted. No action would be taken which would impair the suitability of such areas for preservation as wilderness.

12. Before construction BLM would prepare a site specific environmental assessment to analyze environmental impacts.

Maintenance of range developments on public lands is subject to policy and guidance contained in BLM Manual Section 7120. Fences and cattleguards built primarily for livestock management would be maintained by allottees under agreements complying with BLM guidelines.

BLM would maintain all BLM-owned water developments. Allottees' obligations would be limited to periodic inspections and reporting of damage or malfunction. BLM would develop a schedule for inspection and maintenance sufficient to meet these intervals: fences and cattleguards, 5 years; earthen reservoir, 3 years; springs, well facilities, pipelines, and wildlife waters, annually. Adjustments in maintenance schedules would be made as needed for individual projects.

*Benefit/Cost Analysis*

An economic analysis has been done for every AMP. These analyses are intended to provide a general picture of the cost effectiveness of the AMPs. The major criteria for determining benefit/cost (B/C) ratios are as follows: wildlife, recreation, watershed, and livestock production benefits versus BLM and rancher costs. Some of the range developments originally proposed had to be eliminated; and, as a result, some grazing systems had to be changed. This made the AMPs more cost effective (e.g., B/C ratio of 1 to 1 or higher). Therefore, only those developments considered necessary for the implementation of each AMP are proposed. Seventy-two (72) proposed AMPs have a B/C ratio of .98/1 or higher while the remaining seven have B/C ratios that range from .31/1 to .63/1. One of these seven allotments is large and has few range developments. In order to implement the proposed grazing system several new projects are needed. The B/C ratio for this allotment is .63/1. The other six allotments, with less than 1 to 1 B/C ratios, are small allotments with few developments and yearlong continuous use. In order to improve the existing poor and fair range conditions of the six allotments rotational grazing systems have been proposed on these allotments. The introduction of new developments to initiate grazing systems results in a B/C ratio of less than 1 to 1. The B/C analyses for each AMP may be reviewed at the Socorro District Office.

*Allotment Evaluation*

As AMPs are implemented, studies would be initiated according to BLM Manual 4413. All AMPs would be evaluated at the end of each grazing cycle as provided for in BLM Manual 4413 and each AMP. These studies would focus on actual livestock grazing use, forage utilization, range condition trends, and climatic conditions. Data on wildlife and other resources would be collected. Where objectives are not being met, the AMP would be modified. Such modifications could include changes in the grazing use, season of use, additional range developments, or any combination of these in order to attain the objectives. AMP modifications would require preparation of an environmental assessment record (EAR) or a supplement to this ES before significant change could be effected.

*Flexibility*

Flexiblity in grazing systems is desirable for two reasons: to guard against damage to the vegetative/soil resource by holding to a preestablished formula regardless of changing climate conditions and to avoid imposing a major economic hardship on the range user by forcing him to alternately dispose of and then acquire livestock in response to short-term changes in climatic conditions.

Any flexibility in the above grazing system will be based on variations in the phenological development of the identified key vegetative species. The flexibility will be restricted to seven days on either side of the move in or out date of pastures designated for use in accordance with the grazing plan. Any additional flexibility will be cooperatively agreed upon by both the allottee and District personnel after both parties mutually inspect the allotment. In no case will utilization be allowed to exceed an average of 70 percent in the pasture scheduled for grazing. Any deviation from the grazing schedule must receive BLM's prior approval. Achieving AMP multiple-use objectives will be the primary concern in the consideration of any changes in the grazing schedule.

During periods of drought or other emergencies, adjustments in livestock numbers would be made to guard against damage to the vegetal- soil resource. In instances where adjustments are needed, the operator will be contacted and where possible adjustments would be jointly agreed to. If an agreement cannot be reached, then the needed adjustment would be put into effect by decision.

Because of the variability in forage production, some deviation from the grazing schedule may be necessary. It is anticipated that more flexibility will be required during the first grazing cycle concurrent with range studies designed to monitor stocking rates and range conditions. As final stocking rates are determined and range condition improves, it is anticipated that less deviation from the grazing schedules will be necessary.

## NON-AMP ALLOTMENTS

AMPs are not proposed for 26 allotments encompassing 46,142 acres of public land (Table A-1, Appendix 1, p. A-1). Most of the land in these allotments is State or private (Visual A). In 1975-77 a range survey was conducted on the public land in the non-AMP allotments. All of the public land is in fair or higher range condition class. The grazing preference on public land would be adjusted according to the range survey (Appendices 1 and 2). Livestock adjustments average -27 percent and would range from a decrease of 100 percent to an increase of 47 percent for an overall reduction of 1,940 AUMs (Table A-1, Appendix 1, p. A-1). Thus, as directed by FLPMA Section 402(e), on public land BLM would specify the kind and number of livestock, the season of use, length of permit, and any other provisions necessary to prevent deterioration of public resources. In non-AMP allotments BLM would conduct studies on public land to monitor range condition and trend. If range condition and/or trend is declining, action would be taken to reduce grazing preference.

## ELIMINATION OF GRAZING ALLOTMENTS

Elimination of livestock grazing is proposed for 4 allotments totaling 1,987 acres. These allotments are comprised totally of public land as is shown in Table A-1 (Appendix 1, p. A-1) and Visual A. Three of the four allotments have insufficient forage for livestock grazing. One allotment (1,127 acres) is proposed to be set aside for wildlife and enhancement of the scenic geologic quality of the San Lorenzo Canyon Area (VRM Class II).

## UNALLOTTED ALLOTMENTS

Two allotments composed of small, scattered tracts of public land totaling 2,582 acres are deemed unsuitable for grazing and have never been allotted. These are shown in Table A-1 (Appendix 1, p. A-1) and Visual A.

## IMPLEMENTATION

As adjustments are completed on a proposed AMP allotment, its AMP would be implemented in the next fiscal year (Table 1-3). All scheduled range developments for that allotment would be constructed before the scheduled implementation (Appendix 1, Table A-2, p. A-18).

## MANPOWER REQUIREMENTS

The Proposed Action would require additional personnel on the BLM Socorro District staff. An increase of personnel above the 1976 staffing level would be necessary to conduct engineering surveys for design, construction, and maintenance of range developments and adequate AMP supervision.

Four additional engineering technicians would be employed to survey, design, prepare contracts, and supervise range development construction. On completion of construction, these positions would be incorporated into a crew to maintain all district developments. At least 14 range related positions are needed to implement and supervise the existing and proposed AMPs beginning in fiscal year 1980. These positions would remain on the staff to supervise AMPs and help evaluate or revise AMPs as necessary.

## INTERRELATIONSHIPS

### *Formulation of the Proposed Action*

The Proposed Action is an outgrowth of BLM's planning process which, among other things, seeks to fulfill BLM's obligations to manage public lands so they serve a variety of purposes. Federal policy directs that the following resource values receive consideration: watershed, wildlife, wild

horses, recreation (including scenic), wilderness, and cultural (these are in addition to livestock grazing). (For details on BLM's multiple use planning system see the Final Environmental Impact Statement on Livestock Grazing Management on Public Lands, USDI, December 31, 1974, and BLM Manuals 1601-1608.)

The planning process begins with an inventory of basic resources known as Unit Resource Analysis (URA) and progresses through the management decisions developed in the MFP. Basic resource data for the area are contained in the Stallion URA, 1975, and the Ladron URA, 1976. Management decisions and directions are contained in the Stallion MFP, 1976, the Ladron MFP, 1977. These documents may be reviewed in their entirety at the BLM Socorro District Office. The livestock portions of these MFPs are summarized in Appendix 1, Table A-3, p. A-24.

The MFPs provide guidance and direction for development of action plans -- known as Activity Plans in BLM procedure -- for the specific public resources involved. In the current proposal AMPs are the activity plans for range management.

*Other BLM Programs*

Section 603 of FLPMA directs BLM to complete a wilderness inventory. The first phase involves identification of roadless areas (a contiguous tract of public land that is 5,000 acres or greater). BLM policy directs that no action would be taken which would impair the suitability of such areas for preservation as wilderness.

*Private and State Land*

State and private land comprise 788,354 acres (48 percent) of the ES Area. Ninety-one (91) allotments covered by 79 AMPs contain 45 percent of the total State and private land, or 356,284 acres. Twenty-six (26) allotments consisting mostly of State and private land would not be covered by AMPs.

BLM would influence management of and set the grazing capacity on unfenced, intermingled private and State land on those allotments with AMPs as stated in FLPMA. Section 402(f) states in part: 'Allotment Management Plans shall not refer to livestock operations or range improvements on non-Federal lands except where the non-Federal lands are intermingled with, or, with the consent of the permittee or lessee involved, associated with, the Federal lands subject to the plan.'

BLM issues two types of authorizations for recognizing capacity of privately controlled lands. These are exchange-of-use agreements and percentage on and off licenses. Exchange-of-use agreements must be filed by the operator and approved by the District Manager. The agreements may be issued for periods not to exceed 10 years. Such agreements may be issued to applicants owning or having control of non-public lands that are interspersed with and normally grazed in conjunction with public lands, not to exceed the grazing capacity of such non-public lands. During the term of the agreement BLM manages grazing on these non-public lands. Percentage on and off licenses are issued and generally restricted to allotments that are used and controlled by one operator. BLM determines the proper stocking rate for all lands within the allotment. The operator is billed only for the grazing capacity of the public lands.

*Federal Programs*

**Forest Service**

Three segments of the Cibola National Forest are adjacent to or surround the ES Area. Fourteen allotments border Forest Service (FS) lands, with eight allottees holding Forest Service grazing permits. Two allottees, who operate within allotment 268, have informally incorporated their FS permits with their BLM allotment to form an integrated unit. The other six allottees (allotments 016, 290, 294, 295, 321, and 323) use their FS permits independently of their BLM allotments. About three miles of unfenced boundaries between BLM and FS administered lands exist on two allotments.

Proposed AMPs are coordinated under a national level agreement on resource planning where adjacent lands are administered by the FS and BLM. No major conflicts exist between the present Cibola National Forest grazing management and the BLM Proposed Action.

**Soil Conservation Service**

The Soil Conservation Service (SCS) has developed and continues to cooperate with BLM in developing soil surveys.

**Fish and Wildlife Service**

Under the Endangered Species Act of 1973 (PC 93-205), the Fish and Wildlife Coordination Act, as amended (PL 85-624, 72 Stat. 563, 16 UCS 661), and animal damage control programs, the Fish and Wildlife Service (FWS) has responsibilities to cooperate with other Federal and State agencies in relation to wildlife.

FWS has primary responsibility for control of predatory animals and rodents on public lands when damage to other resources by these animals can be shown and documented. FWS handles reports of animal damage or predation, compiles records, and carries out animal damage con-

trol practices on areas that have been authorized by BLM.

On May 23, 1978 BLM requested formal consultation with the FWS as provided by Section 7 of the Endangered Species Act of 1973. Regulations governing interagency consultation (43 CFR 870-876) require Federal agencies to enter into formal consultation if it is determined a Federal action would or may affect endangered or threatened species or their habitat.

Endangered species inhabiting or historically occurring in the area include the bald eagle (*Haliaeetus leucocephalus*), black-footed ferret (*Mustela nigripes*), peregrine falcon (*Falco peregrinus anatum*), Socorro isopod (*Exosphaeroma thermophilum*), and whooping crane (*Grus americana*).

On July 28, 1978 the FWS responded to BLM's consultation request and their general findings are as follows: It is the biological opinion of the Fish and Wildlife Service that the Proposed Action is not likely to jeopardize the continued existence of these species nor adversely modify habitat essential to their survival. Although there are presently no officially listed threatened and endangered plants in the ES Area, there are at least two species proposed for listing as endangered: *Petalostemum scariosum* and *Silene plankii*. Species formally proposed for listing have no legal status under the Endangered Species Act. However, if these species do become officially listed at any time, BLM would be required to manage these plants as required by law.

**Bureau of Indian Affairs**

The Bureau of Indian Affairs (BIA) administers land use programs in cooperation with Indian pueblos and tribes in the area. There are no Indian free-use allotments in the ES Area. The Acoma, Laguna, Isleta, and Alamo Reservations adjoin the area.

Potential conflicts between the reservations and BLM management programs are mainly related to Laguna livestock trailing across public lands. This occurs twice yearly when sheep are moved to winter or summer grazing areas. The MFP directs BLM to develop a trailing permit and road maintenance agreement with the Lagunas to minimize resource damage.

**Bureau of Reclamation**

BR is responsible for water control and management along the Rio Grande and Rio Puerco. There are approximately 23,052 acres of withdrawn land in the ES Area under BR jurisdiction.

BLM administers livestock grazing on this land under national and local cooperative agreements with BR. Six allotments (250, 261, 272, 277, 279, and 288) contain BR lands which are often important to the total ranch operation in that they provide significant amounts of grazing during certain seasons.

BLM has an agreement with BR for wildlife habitat management on 680 acres of withdrawn land in the Elephant Butte Marsh area. This area contains valuable habitat for important species (discussed in Chapter 2, Wildlife). The Stallion MFP provides guidance for efforts to minimize conflict between livestock grazing and wildlife habitat in the Marsh.

BR plans for phreatophyte control within the Middle Rio Grande Project Area could have impacts on livestock grazing on BR lands administered by BLM. Grazing could be curtailed for an indefinite period of time until regrowth of desirable vegetative species. The BR estimates that 10,641 acres of the 23,052 acres would be cleared of vegetation (Final ES, USDI, BR, 1977). Phreatophytes would be controlled by various mechanical, chemical, and burning methods. During this period of disturbance grazing systems could be disrupted as pastures normally used within the cycle could undergo undetermined periods of rest. This could cause a reduction of up to 366 AUs each year until the control program is completed.

**Department of the Army**

The Department of the Army has a large area adjacent to the ES Area which is withdrawn as a missile and weapons test and research facility known as White Sands Missile Range. This area is primarily used for defense purposes. The Missile Range has a 52-mile common boundary with BLM, private, and State land along the southeastern corner of the ES Area. Access to the range is restricted, and livestock grazing is prohibited by law.

Grazing does occur, by agreement among the Corps of Engineers, BLM, and livestock operators, in the White Sands Missile Range Extension and safety areas adjacent to the range itself. These are extensions from the Missile Range for safety purposes during firing exercises. Residents are evacuated and access restricted during firing periods (usually averaging about 40 days per year).

These firings could affect the Proposed Action by restricting BLM employees' access. This is not expected to be significant due to the short duration and low frequency of the firing periods. Usually they last one day or less and occur only two or three times per month.

The Corps of Engineers has made several studies related to building flood control projects on the Rio Salado and Rio Puerco in the ES Area. These construction proposals would involve large dams to trap sediment and decrease downstream flood and sediment damages along the Rio Grande.

*State Programs*

**New Mexico State Land Office**

There are approximately 293,158 acres owned by the State and administered by the State Land Office (18 percent of the land in the ES Area).

These lands are leased to permittees for livestock grazing and, in most instances, are intermingled with public and private lands. The lessee is considered responsible for these lands and controls public access and use except during the hunting season. The State also issues oil, gas, and geothermal leases on its lands.

The proposed intensive livestock management program would have a direct effect on unfenced, intermingled State lands; in that, if BLM sets the grazing capacity of intermingled State lands below what the State recognizes as the proper capacity, then the State lessee may request an adjustment in recognized capacity for his State lands.

Also, the State Land Office has indicated that they cannot agree to incorporate State lands into BLM AMPs at this time. This could create problems when BLM starts to implement the proposed AMPs. The establishment of an effective working relationship with the State Land Office would be required to help reduce problems associated with the proposed management of the public lands within the ES Area.

**New Mexico Department of Game and Fish**

The New Mexico Department of Game and Fish (NMDG&F) is responsible for fish and wildlife management within the ES Area. BLM is responsible for fish and wildlife habitat management on public lands, while NMDG&F manages actual populations. This requires close coordination. Much of the information used to determine present and estimated future wildlife numbers was supplied by NMDG&F.

*Local Programs*

Few local programs are directly related to the Proposed Action. The Soil and Water Conservation Districts work with landowners through the SCS and Agricultural Stabilization and Conservation Service on conservation measures for farms and ranches. Resource plans developed by SCS are affected by proposed management programs on public lands, and the reverse is also true.

The ES Area lies mainly in Socorro and Valencia Counties. It appears there would be little conflict with county planning or zoning controls.

## DESCRIPTION OF THE ALTERNATIVES

### INTRODUCTION

There are five alternatives to the Proposed Action. They are No Action, Livestock Adjustment, Pasture Capacity Level, Enhancement of Sensitive Resource Values, and No Grazing. The same type of grazing systems were proposed for the Proposed Action, Pasture Capacity Level and Enhancement of Sensitive Resource Values Alternatives. A summary of the key elements for the Proposed Action and each alternative is shown in Table 1-5.

The 123 existing allotments (25 AMPs, 96 non-AMPs, and 2 unallotted allotments) are considered in each of the alternatives. For comparison, impacts of all alternatives are projected for 20 years as in the analysis of the Proposed Action. To provide a basis of comparison impacts of the alternatives are presented with the Proposed Action in the Resource Analysis Chapter. The impact analysis of the alternatives includes the same acreage as in the Proposed Action.

### NO ACTION

Under the No Action Alternative the proposed grazing use would be set at 159,025 AUMs. This results in a 7-percent reduction from the existing grazing use. There would be 2,362 AUMs apportioned for wildlife and 384 AUMs for wild horses. Implementation would entail the following:

1. Adjustments would be made on 19 of the existing 25 AMP allotments (Appendix 1, Table A-1, p. A-1) so that forage utilization on existing AMPs would not exceed 50 percent. Ninety-six (96) allotments would not be adjusted and would continue to have heavy forage utilization (60 to 80 percent).
2. The 25 existing AMPs totaling 372,595 acres (259,531 acres of public land) would be intensively managed, while 96 non-AMP allotments totaling 942,970 acres (576,695 acres of public land) and 2 unallotted allotments consisting of 2,582 acres (all public land) would be managed as they are at present.
3. Range developments are not required for 17 of the 25 existing AMPs. Range developments to be completed on the remaining 8 existing AMPs (065, 121, 129, 254, 255, 283, 288, and 312) are as follows: fences, 14 miles; wells, 3 each; pipeline, 17 miles; troughs, 18 each; storage tanks, 14 each; springs, 1 each; well facilities, 3 each; and wildlife waters, 9 each (Appendix 1, Table A-2, p. A-18). Acres disturbed by range development construction are shown in Table 1-4.

### LIVESTOCK ADJUSTMENT

Under the Livestock Adjustment Alternative no new AMPs would be implemented. The proposed grazing use would be set at 119,465 AUMs. This results in a 30-percent reduction from the existing grazing use. There would be 4,802 AUMs apportioned for wildlife and 384 for wild horses. Implementation would entail the following:

1. Adjustments on all AMP allotments would be made to balance forage use with forage production in accordance with the 1975-77 BLM Range Survey. This allows 50-percent utilization by allotment (Appendix 1, Table A-1, p. A-1).
2. The 25 existing AMPs totaling 372,595 acres (259,531 acres of public land) would be intensively managed while 92 non-AMP allotments totaling 940,983 acres (574,708 acres of public land), 4 elimination of grazing allotments totaling 1,987 acres (all public land), and 2 unallotted allotments consisting of 2,582 acres (all public land) would be managed as they are at present.
3. Range developments would be the same as in the No Action Alternative. Acres disturbed by range development construction are shown in Table 1- 4.

### MANAGEMENT AT PASTURE CAPACITY LEVEL

Under the Pasture Capacity Level Alternative the same grazing systems would be used as outlined in the Proposed Action. The proposed grazing use would be set at 97,036 AUMs. This results in a 43-percent reduction from the existing grazing use. There would be 4,802 AUMs apportioned for

TABLE 1-5

Summary of Key Elements
for the Proposed Action and Alternatives

| | EE | | | PA | | | NA/FE | | | LA | | | PCL | | | ESR | | | NG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | No. AMPs | Acres | AUMs | No. AMPs | Acres | AUMs | No. AMPs | Acres | AUMs | No. AMPs | Acres | AUMs | No. AMPs | Acres | AUMs | No. AMPs | Acres | AMPs | No. AMPs | Acres | AUMs |
| AMPs | | | | | | | | | | | | | | | | | | | | | |
| Rest-Rotation | 10 | 237,477 | 25,762 | 39 | 777,764 | 69,240 | 14 | 265,905 | 21,467 | 14 | 265,905 | 21,467 | 39 | 777,764 | 46,811 | 39 | 777,764 | 46,792 | 0 | 0 | 0 |
| Rest Best | | 0 | 0 | 4 | 177,712 | 17,399 | | 0 | 0 | | 0 | 0 | 4 | 177,712 | 17,399 | 4 | 177,712 | 12,981 | 0 | 0 | 0 |
| Rotational Deferment | 1 | 4,577 | 756 | 13 | 142,419 | 15,458 | 4 | 45,575 | 3,430 | 4 | 45,575 | 3,430 | 13 | 142,419 | 15,458 | 13 | 142,419 | 9,832 | 0 | 0 | 0 |
| Continuous Seasonal | | 0 | 0 | 8 | 33,806 | 1,891 | | 0 | 0 | | 0 | 0 | 8 | 33,806 | 1,891 | 8 | 33,806 | 1,745 | 0 | 0 | 0 |
| Rotational Seasonal | 1 | 5,328 | 384 | 9 | 105,058 | 7,844 | 4 | 48,836 | 3,550 | 4 | 48,836 | 3,550 | 9 | 105,058 | 7,844 | 9 | 105,058 | 4,183 | 0 | 0 | 0 |
| Deferred Rotation | 13 | 125,213 | 13,835 | 6 | 30,677 | 2,272 | 3 | 12,279 | 618 | 3 | 12,279 | 618 | 6 | 30,677 | 2,272 | 6 | 30,677 | 1,026 | 0 | 0 | 0 |
| SUB TOTAL | 25 | 372,595 | 40,737 | 79 | 1,267,436 | 114,104 | 25 | 372,595 | 29,065 | 25 | 372,595 | 29,065 | 79 | 1,267,436 | 91,675 | 79 | 1,267,436 | 76,559 | 0 | 0 | 0 |
| Non-AMPs | 96 | 942,970 | 129,848 | 26 | 46,142 | 5,361 | 96 | 942,970 | 129,848 | 92 | 940,983 | 90,400 | 26 | 46,142 | 5,361 | 26 | 46,142 | 5,342 | 0 | 456,287 | 61,796 |
| Elimination of Grazing | 0 | 0 | 112 | 4 | 1,987 | 0 | 0 | 0 | 112 | 4 | 1,987 | 0 | 4 | 1,987 | 0 | 4 | 1,987 | 0 | 121 | 861,860 | 0 |
| Unallotted | 2 | 2,582 | 0 | 2 | 2,582 | 0 | 2 | 2,582 | 0 | 2 | 2,582 | 0 | 2 | 2,582 | 0 | 2 | 2,582 | 0 | 2 | 0 | 0 |
| GRAND TOTAL | 123 | 1,318,147 | 170,697 | 111 | 1,318,147 | 119,465 | 123 | 1,318,147 | 159,025 | 123 | 1,318,147 | 119,465 | 111 | 1,318,147 | 97,036 | 111 | 1,318,147 | 81,901 | 123 | 1,318,147 | 61,796 /1 |
| Other AUMs | | | | | | | | | | | | | | | | | | | | | |
| Wildlife | | | 1,903 | | | 4,802 | | | 2,362 | | | 4,802 | | | 4,802 | | | 5,018 | | | 79,255 |
| Wild Horses | | | 0 | | | 384 | | | 384 | | | 384 | | | 384 | | | 1,583 | | | 1,695 |
| Range Developments | | | | | | | | | | | | | | | | | | | | | |
| Fences (Miles) | | 1,524 | | | 214 | | | 14 | | | 14 | | | 214 | | | 241 | | | 1,475 | |
| Wells | | 214 | | | 14 | | | 3 | | | 3 | | | 14 | | | 14 | | | 0 | |
| Well Facilities | | 214 | | | 14 | | | 3 | | | 3 | | | 14 | | | 14 | | | 0 | |
| Pipelines (Miles) | | 276 | | | 89 | | | 17 | | | 17 | | | 89 | | | 89 | | | 0 | |
| Storage Tanks | | 44 | | | 41 | | | 14 | | | 14 | | | 41 | | | 41 | | | 0 | |
| Troughs | | 349 | | | 79 | | | 18 | | | 18 | | | 79 | | | 79 | | | 0 | |
| Wildlife Waters/Fenced | | 46 | | | 48 | | | 9 | | | 9 | | | 48 | | | 48 | | | 0 | |
| Cattleguards | | 28 | | | 22 | | | 0 | | | 0 | | | 22 | | | 22 | | | 0 | |
| Springs | | 59 | | | 4 | | | 1 | | | 1 | | | 4 | | | 4 | | | 0 | |
| Earthen Reservoirs | | 331 | | | 1 | | | 0 | | | 0 | | | 1 | | | 1 | | | 0 | |

/1 Existing grazing on non-public lands (includes 169 AUMs previously allocated for wildlife)

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Source: BLM Socorro District Grazing Files, Table 1-4, and Table A-1 (Appendix 1, p. A-1)

wildlife and 384 AUMs for wild horses. Implementation would entail the following:

1. The Pasture Capacity Level Alternative would be initiated by reducing livestock on allotments where rest-rotation, scheduled rest-best, or rotational-seasonal systems have been proposed. These grazing systems call for one or more pastures to be rested for at least one year. The proposed grazing preference would ensure that utilization of grazed pastures would average less than 50 percent on these allotments. Average utilization of all pastures on 51 AMPs affected would not exceed 40 percent.
2. The 79 AMPs totaling 1,267,436 acres (788,097 acres of public land) would be intensively managed while 26 non-AMPs totaling 46,142 acres (all public land), 4 elimination of grazing allotments totaling 1,987 acres (all public land), and 2 unallotted allotments consisting of 2,582 acres (all public land) would be managed as they are at present (Appendix 1, Table A-1, p. A-1).
3. Range developments would be the same as in the Proposed Action. Acres disturbed by range development construction are shown in Table 1-4.

## ENHANCEMENT OF SENSITIVE RESOURCE VALUES

Under the Enhancement of Sensitive Resource Values Alternative grazing use would be based on the Pasture Capacity Level Alternative with additional deductions to enhance sensitive resource values (15,134 AUMs on 224,655 acres). The proposed grazing use would be set at 81,901 AUMs. This results in a 52-percent reduction from the existing use. There would be 5,018 AUMs apportioned for wildlife and 1,583 AUMs for wild horses.

Table 1-6 summarizes the total acres and AUMs deducted by pasture by allotment for enhancing the sensitive resource values. For some pastures the same acres and AUMs have been deducted to enhance a number of resources. Deductions in items 1 through 6 do not equal the totals for the 'AUMs and Acres Deducted' columns in Table 1-6 because of overlapping deductions where two or more resources are involved. The individual deductions for each resource, for each allotment, are in the BLM Socorro District Office. Implementation would entail the following:

1. Livestock grazing would be eliminated in 76 pastures (11,071 AUMs on 184,802 acres) that have 30 percent or more area in poor range condition and/or critical or severe erosion condition (Table 1-6). These pastures occur on 40 AMPs; grazing would be reduced on 31 of these allotments and eliminated on 9. Grazing would be allowed when range condition improves to fair or better and the erosion condition class improves to a moderate rating.
2. Winter and spring deferment would be provided in at least one pasture on all allotments identified as deer and antelope ranges. In order to meet this goal, allotments 252 and 303 would have their grazing systems revised. No AUMs or acres would be removed from livestock use.
3. Twelve riparian areas that represent important or unique wildlife habitat on public land would not be grazed by livestock (Table 1-6). A total of 27 miles of fence would be needed for the 12 areas. The exclosures would permanently remove livestock use from 2,320 acres and reduce livestock grazing by 216 AUMs.
4. There would be a reduction of 949 AUMs in the VRM Class I Areas (allotments: 006, 039, 052, 059, 077, and 086) and 2,236 AUMs in VRM Class II Areas (allotments: 129, 152, 277, and 293) (Table 1-6). Five hundred and seventy (570) AUMs would be eliminated from pasture 3B in allotment 293 to protect the scenic soaptree yucca area. No developments would be allowed in VRM Class II Areas. VRM Classes III and IV Areas would be enhanced as range and watershed conditions improve as proposed in paragraph one of this alternative.
5. In order to return the wild horse home range to as near its natural state as possible, livestock grazing would be eliminated from the New Tank, New Well, and Bustos Pastures of the Bordo Atravesado Allotment (254). This would make 1,583 AUMs on 19,606 acres available for wild horse use; however, this does not necessarily mean that horse numbers would increase. All interior fences in these pastures would be removed to improve the free roaming character of the area. Vehicle use would be restricted from the area to avoid wild horse harassment and disturbance.
6. To prevent wind erosion and dune development pastures containing deep sand soils (60 inches or greater) with sparse vegetative cover would not be grazed by livestock (Table 1-6). Twenty (20) AUMs and approximately 360 acres would be removed from livestock grazing.
7. The 79 AMPs totaling 1,267,436 acres (788,097 acres of public land) would be intensively managed while 26 non-AMPs totaling 46,142 acres (all public land), 4 elimination of grazing allotments totaling 1,987 acres (all public land), and 2 unallotted allotments consisting of 2,582 acres (all public land) would be managed as they are at present.
8. Range developments would be the same as under the Proposed Action with the addition of 27 miles of fence for a total of 241 miles. Some would be delayed until excluded pastures

TABLE 1-6

SUMMARY OF THE ENHANCEMENT OF SENSITIVE
RESOURCE VALUES ALTERNATIVE



| Allot. | Pasture /6 | Acres Deducted | AUMs Deducted | Poor Range Condition /1 | Critical or Severe Watershed Condition /2 | Comb. of Range and Watershed /3 | Soils | Wilder-ness /4 | Visual Re-sources | Wild-life | Wild Horses | Acres Available /5 | AUMs Available /5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 002 | Badlands | 3,138 | 31.9 | | | X | | | X | | | | |
| | H.Q. Trap | 60 | 5.6 | | | X | | | | | | | |
| | Horse | 939 | 41.4 | | | X | X | | | | | | |
| | Shipping | 906 | 59.3 | | | | | | | | | 43,480 | 1,772 |
| 006 | Canon del Norte | -0- | 133.0 | | | | | X | | | | | |
| | Headquarters | -0- | 11.0 | | | | | X | | | | 13,731 | 992 |
| 016 | Barranco | 320 | 19.5 | | | | | | | X | | | |
| | Puertecito | 400 | 57.0 | | | | | | | X | | 25,117 | 1,627 |
| 036 | 1 | 2,666 | 134.5 | | | X | | | | X | | 9,430 | 731 |
| 037 | Monte | -0- | 87.0 | | | | | X | | | | | |
| | East | -0- | 53.0 | | | | | X | | | | 14,076 | 769 |
| 052 | 1 | 2,090 | 78.0 | | | | | X | | | | -0- | -0- |
| 059 | Winter | -0- | 53.0 | | | | | X | | | | | |
| | La Jencia | -0- | 37.0 | | | | | X | | | | | |
| | Upper Salado | -0- | 38.0 | | | | | X | | | | | |
| | River | -0- | 18.0 | | | | | X | | | | 27,690 | 1,351 |
| 077 | H.Q. Trap | 188 | 11.2 | | X | | | | | | | | |
| | West | 3,444 | 70.6 | | X | | | | | | | 2,941 | 54 |
| 086 | North | -0- | 104.0 | | | | | X | | | | | |
| | Mountain | -0- | 91.0 | | | | | X | | | | | |
| | Aguayo | -0- | 192.0 | | | | | X | | | | 27,885 | 2,013 |
| 090 | Middle | 4,752 | 197.8 | | | X | | | | | | 9,147 | 392 |
| 114 | South Trap | 820 | 26.9 | | | X | | | | | | | |
| | East | 160 | 20.0 | | | | | | | X | | 45,593 | 3,803 |

TABLE 1-6 (continued)

SUMMARY OF THE ENHANCEMENT OF SENSITIVE
RESOURCE VALUES ALTERNATIVE



| Allot. | Pasture /6 | Acres Deducted | AUMs Deducted | Poor Range Condition /1 | Critical or Severe Watershed Condition /2 | Comb. of Range and Watershed /3 | Soils | Wilder-ness /4 | Visual Re-sources | Wild-life | Wild Horses | Acres Available /5 | AUMs Available /5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 122 | East | 3,264 | 160.9 | | | X | | | | | | 2,153 | 75 |
| 129 | 5 | 8,829 | 722.3 | | | X | | | | | | | |
| | 8 | 6,334 | 335.6 | | | X | | | | | | | |
| | Crane Place | 160 | 14.7 | | | X | | | | | | | |
| | 4 | 13,231 | 1,235.0 | | | | | | X | X /7 | | 43,791 | 2,909 |
| 152 | Cerro Verde East | -0- | 49.0 | | | | | | X | | | 32,078 | 2,098 |
| 250 | 1 A | 819 | 11.4 | | | X | | | | | | | |
| | 2 A | 1,431 | 5.9 | | | X | | | | | | | |
| | 2 | 3,097 | 48.7 | | | X | | | | | | | |
| | 3 | 1,678 | 6.7 | | | X | | | | | | | |
| | 3 A | 761 | 14.1 | | | X | | | | | | | |
| | Bosque | 1,282 | 19.2 | | | X | | | | | | 8,902 | 116 |
| 252 | H.Q. Trap | 169 | 6.8 | | | X | | | | | | | |
| | Shipping | 345 | 12.7 | | | X | | | | | | 20,771 | 1,490 |
| 253 | West | 1,518 | 54.9 | X | | | | | | | | 1,599 | 149 |
| 254 | New Tank | 6,104 | 456.9 | | | | | | | | X | | |
| | Bustos | 5,715 | 527.1 | | | | | | | | X | | |
| | New Well | 7,787 | 597.7 /8 | | | | | | | | X | 5,557 | 565 |
| 255 | All | 6,127 | 283.7 | | | X | | | | | | -0- | -0- |
| 256 | 3 North | 490 | 34.2 | | | X | | | | | | 15,297 | 967 |
| 258 | 1 North | 6,939 | 565.9 | X | | | | | | | | 5,932 | 200 |
| 260 | Horse Trap | 358 | 92.8 | | | X | | | | | | | |
| | West | 4,525 | 208.3 | | | X | | | | | | 13,512 | 1,065 |
| 261 | Bosque | 6,355 | 804 | X | | | | | | | | 23,763 | 1,736 |

TABLE 1-6 (continued)

SUMMARY OF THE ENHANCEMENT OF SENSITIVE
RESOURCE VALUES ALTERNATIVE



| Allot. | Pasture /6 | Acres Deducted | AUMs Deducted | Poor Range Condition /1 | Critical or Severe Watershed Condition /2 | Comb. of Range and Watershed /3 | Soils | Wilder-ness /4 | Visual Re-sources | Wild-life | Wild Horses | Acres Available /5 | AUMs Available /5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 262 | South | 9,999 | 686.84 | | | X | | | | | | 13,400 | 1,444 |
| 264 | West Trap | 209 | 11.9 | | | X | | | | | | 10,431 | 1,134 |
| 268 | Torreon | 240 | 36.4 | | | | | | | X | | | |
| | Bianchi | 160 | 41.3 | | | | | | | X | | 35,495 | 1,870 |
| 275 | Duffy | 3,241 | 271.5 | | | X | | | | | | | |
| | Pinto | 2,893 | 299.4 | | | X | | | | | | 67,090 | 5,453 |
| 277 | Quervo | 1,303 | 24.9 | | | X | | | | | | | |
| | Gorbon | 6,625 | 217.2 | | | X | | | | | | | |
| | Chaote | 1,539 | 40.86 | | | X | | | | | | | |
| | Bosque | 7,190 | 883.2 | | | X | | | X | | | 10,035 | 371 |
| 279 | Trap 2 | 111 | 3.04 | X | | | | | | | | | |
| | 5 | 3,271 | 6.96 | X | | | | | | | | | |
| | 8 | 2,980 | 91.68 | X | | | | | | | | 14,796 | 1,296 |
| 285 | House | 3,841 | 254.6 | | X | | | | | | | | |
| | South Sand | 15,084 | 886.2 | | X | | | | | | | 8,950 | 1,076 |
| 287 | South | 2,502 | 64.7 | | X | | | | | | | 2,612 | 61 |
| 288 | Trap | 40 | 2.6 | X | | | | | | | | | |
| | West | 880 | 25.8 | X | | | | | | | | | |
| | North | 2,632 | 122.2 | X | | | | | | X | | 1,750 | 44 |
| 293 | 3 B | 3,462 | 569.7 | | | | | | X | | | 42,901 | 3,708 |
| 294 | East Ingram | 3,296 | 333.0 | X | | | | | | | | | |
| | South | 3,461 | 303.3 | X | | | | | | | | | |
| | Trap 3 | 245 | 27.4 | X | | | | | | | | 4,529 | 480 |

TABLE 1-6 (continued)

SUMMARY OF THE ENHANCEMENT OF SENSITIVE RESOURCE VALUES ALTERNATIVE



| Allot. | Pasture /6 | Acres Deducted | AUMs Deducted | Poor Range Condition /1 | Critical or Severe Watershed Condition /2 | Comb. of Range and Watershed /3 | Soils | Wilder-ness /4 | Visual Re-sources | Wild-life | Wild Horses | Acres Available /5 | AUMs Available /5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 297 | 2 | 2,084 | 0.1 | | | X | | | | | | | |
| | 3 | 63 | -0- | | | X | | | | | | | |
| | 4 | 160 | 1.6 | | | | | | | X | | | |
| | 5 | 3,061 | -0- | | | X | | | | | | | |
| | 6 | 4,410 | 189.5 | | | X | | | | | | | |
| | 7 | 27 | -0- | | | X | | | | | | 10,191 | 131 |
| 308 | North | 160 | 16.8 | | | | | | | X | | | |
| | South | 2,937 | 67.7 | | | X | | | | | | 2,430 | 38 |
| 312 | West | 2,719 | 78.4 | | | X | X | | | | | | |
| | East | 2,802 | 161.9 | | | X | | | | | | | |
| | South | 3,929 | 96.8 | | | X | | | | | | -0- | -0- |
| 315 | All | 4,328 | 67.6 | | | X | | | | X | | -0- | -0- |
| 317 | East | 1,363 | 58.9 | | | X | | | | | | | |
| | West | 1,967 | 40.5 | | | X | X | | | | | | |
| | Bosque | 410 | 4.6 | | | X | X | | | | | 5 | -0- |
| 318 | South | 1,676 | 48.0 | X | | | | | | | | | |
| | Trap | 8 | 0.11 | X | | | | | | | | 3,644 | 122 |
| 322 | 6 West | 4,162 | 367.9 | | X | | | | | | | 13,404 | 854 |
| 323 | 7 | 1,309 | 71.4 | | X | | | | | | | 12,008 | 1,006 |
| 325 | 2 | 330 | 27.7 | | | X | | | | | | | |
| | 3 | 642 | 16.1 | | | X | | | | | | 12,894 | 976 |
| 327 | 1 | 179 | 26.0 | | X | | | | | | | | |
| | 4-Center | 1,038 | 64.5 | | X | | | | | | | 10,596 | 677 |
| 113 | All | 290 | 19.0 | X | | | | | | | | -0- | -0- |

TABLE 1-6 (continued)

SUMMARY OF THE ENHANCEMENT OF SENSITIVE
RESOURCE VALUES ALTERNATIVE



| Allot. | Pasture /6 | Acres Deducted | AUMs Deducted | Poor Range Condition /1 | Critical or Severe Watershed Condition /2 | Comb. of Range and Watershed /3 | Soils | Wilder-ness /4 | Visual Re-sources | Wild-life | Wild Horses | Acres Available /5 | AUMs Available /5 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 164 | All | 203 | -0- | | X | | | | | | | -0- | -0- |
| 286 | All | 376 | -0- | X | | | | | | | | -0- | -0- |
| 302 | All | 375 | -0- | X | | | | | | | | -0- | -0- |
| 311 | All | 109 | -0- | X | | | | | | | | -0- | -0- |
| 357 | All | 1,127 | 37.5 | | | X | | | X | | | -0- | -0- |
| Subtotal | | 224,655 | 14,506 | | | | | | | | | 669,606 | 45,615 |
| All Other Allotments | | -0- | -0- | | | | | | | | | 423,886 | 36,286 |
| Grand Total | | 224,655 | 14,506 | | | | | | | | | 1,093,492 | 81,901 |

/1 Elimination of Pastures having 30% or more of its acreage in poor (25% of potential) range condition
/2 Elimination of Pastures having 30% or more of its acreage in critical or severe watershed condition
/3 Elimination of Pastures having 30% or more of its acreage in a combination of poor range and critical or severe watershed condition
/4 Reduction of Grazing within the Ladron Mountain Wilderness Study Area and elimination of Pasture 3B of 297 to protect scenic soaptree and yucca area
/5 Total available acres and AUMs in the allotment
/6 Pastures listed here have, in some cases, been combined into larger pastures by the opening of gates, these larger pastures are used in the proposed grazing systems
/7 Two Riparian Areas are in one pasture
/8 384 of these AUMs have already been deducted from the Pasture Capacity starting level

Source: BLM Socorro District Files

are improved enough to be included in the grazing system. Acres disturbed by range development construction are shown in Table 1-4.

**NO GRAZING**

Under the No Grazing Alternative all domestic livestock would be removed from public lands. There would be 79,255 AUMs apportioned for wildlife and 1,695 AUMs for wild horses; however, this does not necessarily mean that wildlife or wild horse numbers would increase. Implementation would entail the following:

1. Elimination of grazing would occur on public and BR lands (861,860 acres). No new AMPs would be developed, and those now implemented would be cancelled. There would be approximately 61,796 AUMs available for livestock grazing on non-public land. This is a 64-percent reduction from grazing use.

2. State and private land which is intermingled with public land would have to be used in a way that avoids grazing trespass on public land. It is estimated that 1,475 miles of new fence on the boundaries of private and State land would have to be built by ranchers to exclude livestock from public land. Two or three on-ground and aerial trespass inspectors would be needed. Construction would cost approximately $2,950,000. Short-term disturbance from fence construction would occur on 1,475 acres while long-term disturbance would occur on 295 acres (Table 1-4).

3. No range developments would be maintained or constructed unless necessary for other BLM programs such as wildlife or watershed. Some range developments such as existing fences, which serve no useful purpose and which create undesirable visual intrusions, would be removed from the landscape.

2

# CHAPTER 2

## RESOURCE ANALYSIS

## INTRODUCTION

This chapter contains the Existing and Future Environments for each resource. In addition, an analysis of the Impacts of the Proposed Action and alternatives, Mitigating Measures, Unavoidable Adverse Impacts, and Irreversible and Irretrievable Commitments is included if necessary.

### *Existing Environment*

This section describes the resources in the Bureau of Land Management (BLM) East Socorro Environmental Statement (ES) Area as they exist today. Emphasis has been placed on those resource components most likely to be impacted if the Proposed Action or one of the alternatives is implemented.

### *Future Environment*

This section describes the resources in the future of the East Socorro ES Area 20 years from the date of implementation. Resource trends which are described here are derived from the existing environment. Livestock adjustments and continued intensive management programs on the 25 existing allotment management plan (AMP) allotments are assumed for the projections in this section.

### *Impacts - Assumptions and Analysis Guidelines*

The impacts resulting from implementation of the Proposed Action and each of the alternatives are identified and analyzed in this section. The resource is analyzed by the major resource components. If a resource or section is not affected or if the impacts are considered insignificant, no discussion is included. Initial impacts in Vegetation and Soils often generate impacts in other resources. These impacts, as well as secondary impacts generated by impacts to other resources, were identified and analyzed through an interdisciplinary team approach. The impacts generated through the analysis of these resources were then traced, analyzed, and incorporated into other resource sections.

Short-term impacts are those expected to take place in and last less than 5 years; long-term impacts are those which would be evident in the 20th year. Short- and long-term data is presented on an annual basis. Local impacts are those restricted to the immediate vicinity of the action discussed, although actual distance varies according to the resource. Area-wide impacts refer to the entire ES Area unless otherwise specified.

Six kinds of grazing systems are proposed in the ES Area. These systems are designed to meet the plant needs as described in Chapter 1. Since 98 percent of the plant species are warm-season species, the July through September non-use treatment that is built into each grazing system meets the plant needs (Figure 2-10). It has been concluded, from literature reviews, that vegetative responses cannot be differentiated among the various grazing systems (Heady et al, 1972; Cook et al, 1962). Therefore, this analysis assumes that vegetation would respond similarly for each of the six proposed grazing systems. The vegetative responses are primarily affected by range condition and range site potential.

Vegetative increases predicted in the Proposed Action are based on vegetative differences between key and comparison areas within the ES Area. These differences were measured by AMP writers during development of AMPs (Appendix 2, p. A-47). A literature review was conducted to identify research studies that measured vegetal response to a particular management technique. These studies were conducted throughout the western states, and the results reflect the range in biological variability. The reader is given the overall average response which verifies that the predictions made, based on key and comparison area data are realistic.

Vegetative predictions made in the various alternatives are based on the predicted values of the Proposed Action and the research literature. The research literature was used to calculate the average herbage response to management implications. This average change was used as a multiplier to adjust the values predicted in the Proposed

Action. The complete methodology is outlined in Appendix 2, p. A-44.

Trend studies are inadequate in the ES Area. For the purpose of this analysis range trend is assumed to be stable. As shown on Table A-6 (Appendix 2, p. 41) 70 percent of the area is presently in poor and fair range condition. This indicates that trend has generally stabilized in a less than desirable range condition.

Because actual livestock use data is not known, existing grazing preference is used. Informal conversations with allottees indicate that some are operating at levels lower than the existing use. If this is correct, the actual impacts would be less than that projected in the impact analysis.

The impacts of range development construction are quantified in acres disturbed (total is 559 acres). When taken in context of the total acreage in the ES Area (1,650,214 acres) the impacts of construction to various resources, such as vegetative production, sediment yield, runoff, etc., were considered unmeasurable. Table 2-1 summarizes and compares the impacts to the major resource components.

Analyses for all resources except socio-economics were based on public land AUMs on all allotments and private and State land AUMs on AMP allotments. In socio-economics, the analysis included all of the above AUMs plus the estimated AUMs on private and State land on non-AMP allotments. In order to determine direct income and thoroughly analyze the impacts in the socio-economic section discussion it was necessary to include all AUMs in the ES Area.

### *Mitigating Measures*

The measures analyzed in this section are actions which would reduce or eliminate impacts identified as adverse by the resource specialist. Each measure is analyzed in relation to a specific impact. All measures are real, enforceable, and committed to by the District Manager should the Proposed Action be approved and implemented.

### *Unavoidable Adverse Impacts*

This section discusses only the major unavoidable adverse impacts that would result from implementation of the Proposed Action. These are impacts that cannot be mitigated or remain after partial mitigation of the impacts.

### *Irreversible and Irretrievable*

This section considers the irreversible and irretrievable commitment of resources. It identifies the extent to which the Proposed Action would irreversibly curtail the potential uses of the land and resources. In this context, the term irreversible is defined as incapable of being reversed; once initiated, use would continue. The term irretrievable means irrecoverable; not reasonably retrievable; once used, it is not replaceable.

## PHYSICAL SETTING

### *Existing Environment*

This section presents a summary of the physical setting of the ES Area.

#### CLIMATE

The climate of the area is continental, and ranges from arid in the centrally located Rio Grande Valley to semiarid on the upland areas on either side of the valley. The summers are hot and relatively moist, and the winters are cool and dry. Average summer temperatures are in the 90-degree range. Average winter temperatures drop to 34 degrees. The frost-free period is from mid-April to late October.

Average annual precipitation ranges from 8 inches in the valley to 14 inches or more on mesas and uplands (Map 2-1). Fifty (50) to 60 percent of the total average annual precipitation falls during June through September. Most precipitation received comes in the form of local, short-duration, high-intensity summer thunderstorms.

Annual average wind speed is about 9 miles per hour, although spring winds are often much stronger, gusting to 40 miles per hour. The strongest winds usually come from the southwesterly quadrant. Evaporation loss from water surfaces is about 60 to 70 inches per year.

#### TOPOGRAPHY

Terrain varies considerably throughout the grazing area. Elevations range from about 4,550 feet in the valley to about 9,176 feet on Ladron Mountain. Major features include the Rio Grande Valley, the Magdalena, Socorro-Lemitar, and Ladron Mountains, Jornada del Muerto plains and the mesa-studded areas to the east and northwest.

#### GEOLOGY

Most of the area is in the Basin and Range physiographic province and is dominated by the Rio Grande Rift. Uplifted fault blocks of Paleozoic rock units form the San Mateo-Socorro-Lemitar Mountains to the west of the Rio Grande, and the San Andres-Chupadera Mesa-Los Pinos Mountains to the east. The Rio Grande Valley is down thrown fault blocks, filled to a depth of 20,000 feet with sediments eroded from the neighboring mountains.

The easterly portion of the ES Area is a mesa of Paleozoic rock units partially overlain by recent sediments. Ladron Mountain, west of the Rio Grande, is composed, predominately, of metasedi-

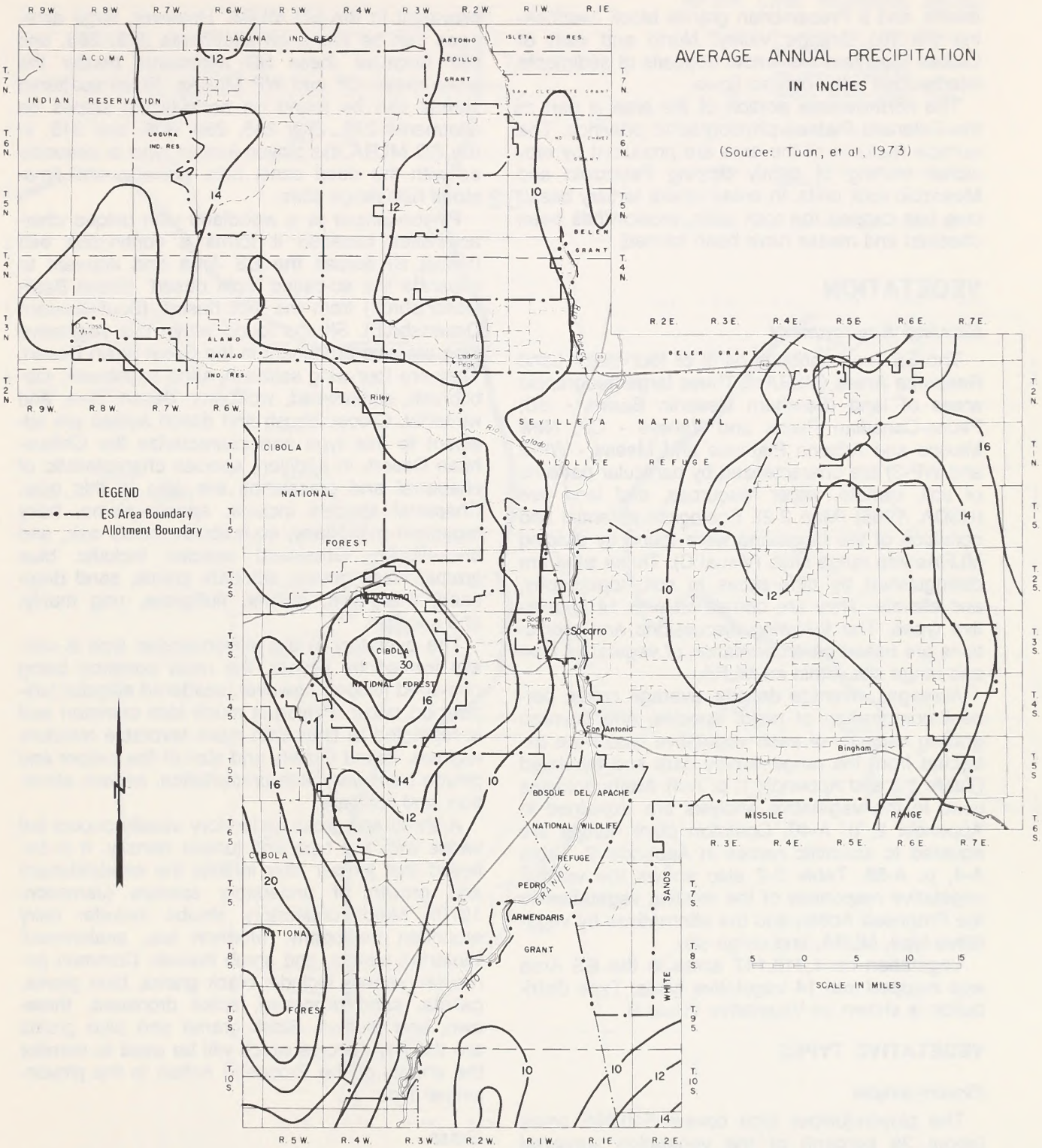
TABLE 2-1

SUMMARY OF IMPACTS

| | Existing | Proposed Action | | No Action Alternative and Future Environment | | Livestock Adjustment Alternative | | Pasture Capacity Level Alternative | | Enhancement of Sensitive Resource Values Alternative | | No Grazing Alternative | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term |
| Grazing Use (AUMs) | 170,697 | 119,465 | 173,916 | 159,025 | 170,836 | 119,465 | 165,736 | 97,036 | 205,665 | 81,901 | 209,620 | 0 | 0 |
| Physical Setting | STABLE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE |
| Vegetation | | | | | | | | | | | | | |
| Production (AUMs) | 134,942 | 51 | 184,488 | UM | 146,988 | 51 | 174,811 | 51 | 216,592 | 51 | 221,920 | S1 | 359,924 |
| % Change from Existing (Range Survey) | - | 51 | +37 | UM | +9 | 51 | +30 | 51 | +61 | 51 | +64 | 51 | +167 |
| Range Condition (% change) | | | | | | | | | | | | | |
| Excellent | 7,086 ac. | UM | +338 | UM | +81 | UM | +271 | UM | +551 | UM | +551 | UM | +542 |
| Good | 319,807 ac. | UM | +11 | UM | +3 | UM | +8 | UM | +17 | UM | +17 | UM | +17 |
| Fair | 770,700 ac. | UM | -6 | UM | -2 | UM | -5 | UM | -10 | UM | -10 | UM | -10 |
| Poor | 125,306 ac. | UM | -8 | UM | -2 | UM | -6 | UM | -12 | UM | -12 | UM | -12 |
| Density (%) | 8 | UM | 11 | UM | 51 | UM | 10 | UM | 12 | UM | 12 | UM | 11 |
| Cover (%) | 37 | UM | 40 | UM | 51 | UM | 39 | UM | 45 | UM | 45 | UM | 45 |
| Soils | | | | | | | | | | | | | |
| Sediment Yield (Ac-Ft/Yr) | 1,410 to 1,555 | UM | 1,055 to 1,170 | UM | 1,310 to 1,450 | UM | 1,135 to 1,255 | UM | 980 to 1,080 | UM | 980 to 1,080 | UM | 455 to 500 |
| % Decrease from Existing | - | UM | 26 | UM | 7 | UM | 19 | UM | 31 | UM | 31 | UM | 46 |
| Water | | | | | | | | | | | | | |
| Infiltration (in./hr.) | .64 | UM | .98 | UM | .64 | UM | .98 | UM | .98 | UM | .98 | UM | 1.19 |
| Runoff (% decrease from Existing) | - | UM | 3 | UM | 1 | UM | 3 | UM | 12 | UM | 12 | UM | 16 |
| Groundwater withdrawal (Ac-Ft/Yr) | 271 | 214 | 277 | 258 | 272 | 214 | 266 | 189 | 313 | 171 | 318 | 150 | 150 |
| Livestock Grazing | | | | | | | | | | | | | |
| Number of Operators | 102 | 96 | 98 | 102 | 102 | 96 | 98 | 96 | 98 | 91 | 98 | 87 | 87 |
| AUs | 20,081 | 15,804 | 20,529 | 19,108 | 20,200 | 15,804 | 19,724 | 13,931 | 23,183 | 12,674 | 23,598 | 11,006 | 11,006 |
| Socio-Economics | | | | | | | | | | | | | |
| Direct Income ($) | 2,507,057 | 1,979,537 | 2,552,837 | 2,399,368 | 2,532,589 | 1,979,537 | 2,467,854 | 1,689,481 | 2,613,109 | 1,549,126 | 2,758,084 | 1,332,536 | 1,332,536 |
| Permit Value ($1000) | 18,081.0 | 14,226.3 | 18,361.8 | 17,286.3 | 18,137.7 | 14,226.3 | 17,811.0 | 12,525.3 | 20,857.5 | 11,407.5 | 21,267.9 | 9,953.1 | 9,953.1 |
| Wildlife | | | | | | | | | | | | | |
| (AUMs Apportioned) | 1,903 | 4,802 | 5,041 | 2,362 | 2,394 | 4,802 | 4,893 | 4,802 | 5,057 | 5,018 | 5,287 | 79,255 | 138,914 |
| Deferred Habitat (ac.) | | | | | | | | | | | | | |
| Deer-winter deferment | 17,458 | 95,101 | 95,101 | 24,985 | 24,985 | 24,985 | 24,985 | 95,101 | 95,101 | 112,151 | 115,107 | 217,673 | 217,673 |
| Antelope-spring deferment | 26,848 | 212,568 | 212,568 | 49,728 | 49,728 | 49,728 | 49,728 | 212,568 | 212,568 | 235,615 | 212,568 | 459,050 | 459,050 |
| Minimum deferred at any one time | 100,210 | 315,239 | 315,239 | 108,053 | 108,053 | 108,053 | 108,053 | 315,239 | 315,239 | 533,430 | 337,525 | 838,808 | 838,808 |
| Wild Horses | | | | | | | | | | | | | |
| (AUMs Apportioned) | 0 | 384 | 549 | 384 | 549 | 384 | 549 | 384 | 549 | 1,583 | 3,111 | 1,695 | 3,535 |
| Cultural Resources | | | | | | | | | | | | | |
| (Rate of Disturbance from Existing) | - | 50 | 50 | same as EE | 50-less than PA | 50-slightly less than PA | 50-slightly less than PA | 50-slightly greater than PA | 50-slightly greater than PA | SD-slightly greater than PA | 50-slightly greater than PA | 50-greater than PA | 50-greater than PA |
| Recreation | | | | | | | | | | | | | |
| (Visitor Days) | 34,946 | 51 | 49,903 | 5I | 49,903 | 51 | 49,903 | 51 | 49,903 | 51 | 49,903 | 5I | 49,903 |
| Visual Resources | | | | | | | | | | | | | |
| (Acres Disturbed) | - | 579 | 339 | 90 | 67 | 90 | 67 | 579 | 339 | 607 | 344 | 1,475 | 295 |
| Wilderness | STABLE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE | NO CHANGE |

UM = Unmeasurable in the short term
SD = Slight, but unmeasurable, decrease
SI = Slight, but unmeasurable, increase
EE = Existing Environment
PA = Proposed Action

Source: Tables 1-4, 1-5, 2-2, 2-6, 2-9, 2-14, 2-18, 2-19, 2-24, 2-25, 2-28, 2-31, 2-34, 2-35, A-18, and A-24




**MAP 2-1.** Average Annual Precipitation

ments, and a Precambrian granite block overlooking the Rio Grande Valley. North and east of Ladron Mountain are recent deposits of sediments interbedded with volcanic flows.

The northwestern portion of the area is part of the Colorado Plateau physiographic province. The surface features of the area are produced by erosional etching of gently dipping Paleozoic and Mesozoic rock units. In areas where tertiary basalt lava has capped the rock units, erosion has been checked and mesas have been formed.

## VEGETATION

### *Existing Environment*

The ES Area contains parts of four Major Land Resource Areas (MLRAs). These large geographic areas of land (Southern Desertic Basins - SD, Pecos-Canadian Plains and Valleys - CP, New Mexico and Arizona Plateaus and Mesas - WP-2 and WP-3) are characterized by particular patterns of soil, climate, water resources, and land use (USDA, 1965) (Map 2-2). Ecological potential and condition of the rangeland were found by dividing MLRAs into range sites (Visual C). These sites are distinguished by differences in soil, topography, and climate. They are correlated with 14 vegetative types. The following discussions and predictions are based on a correlation of vegetative type and range site within an MLRA.

Acreages, average density, average cover, percent composition of major species, and average grazing capacity of each vegetative type were extracted from the range survey data and tabulated (Table 2-2 and Appendix 1, p. A-8). Methodologies used in the vegetative analysis are explained in Appendix 2, p. A-40. Common plant names are equated to scientific names in Appendix 2, Table A-4, p. A-38. Table 2-2 also shows the various vegetative responses of the existing vegetation to the Proposed Action and the alternatives by vegetative type, MLRA, and range site.

Vegetation on 1,318,147 acres in the ES Area was mapped into 14 vegetative types. Type distribution is shown on Vegetative Visual B.

### VEGETATIVE TYPES

#### *Pinyon-Juniper*

The pinyon-juniper type covers 510,095 acres (about 39 percent) of the vegetation surveyed (Figure 2-1). Its timbered stands are found on high plains, mesas, breaks, ridges, rolling hills, and on low to mid-elevation mountain slopes over most of the CP and WP MLRAs. It occurs on most soils within these MLRAs with the best stands growing on the sandy, limestone hills, basalt hills, malpais, and loamy range sites. Pinyon-juniper is not as prevalent in the SD MLRA. However, large acreages can be found on allotments 263, 283, and 297 because these SD allotments border the more mesic CP and WP MLRAs. Small scattered stands can be found on north-facing slopes on allotments 277, 279, 288, 299, 308, and 315. In the SD MLRA the pinyon-juniper type is associated with the deep sand, hills, gravelly, and limestone hills range sites.

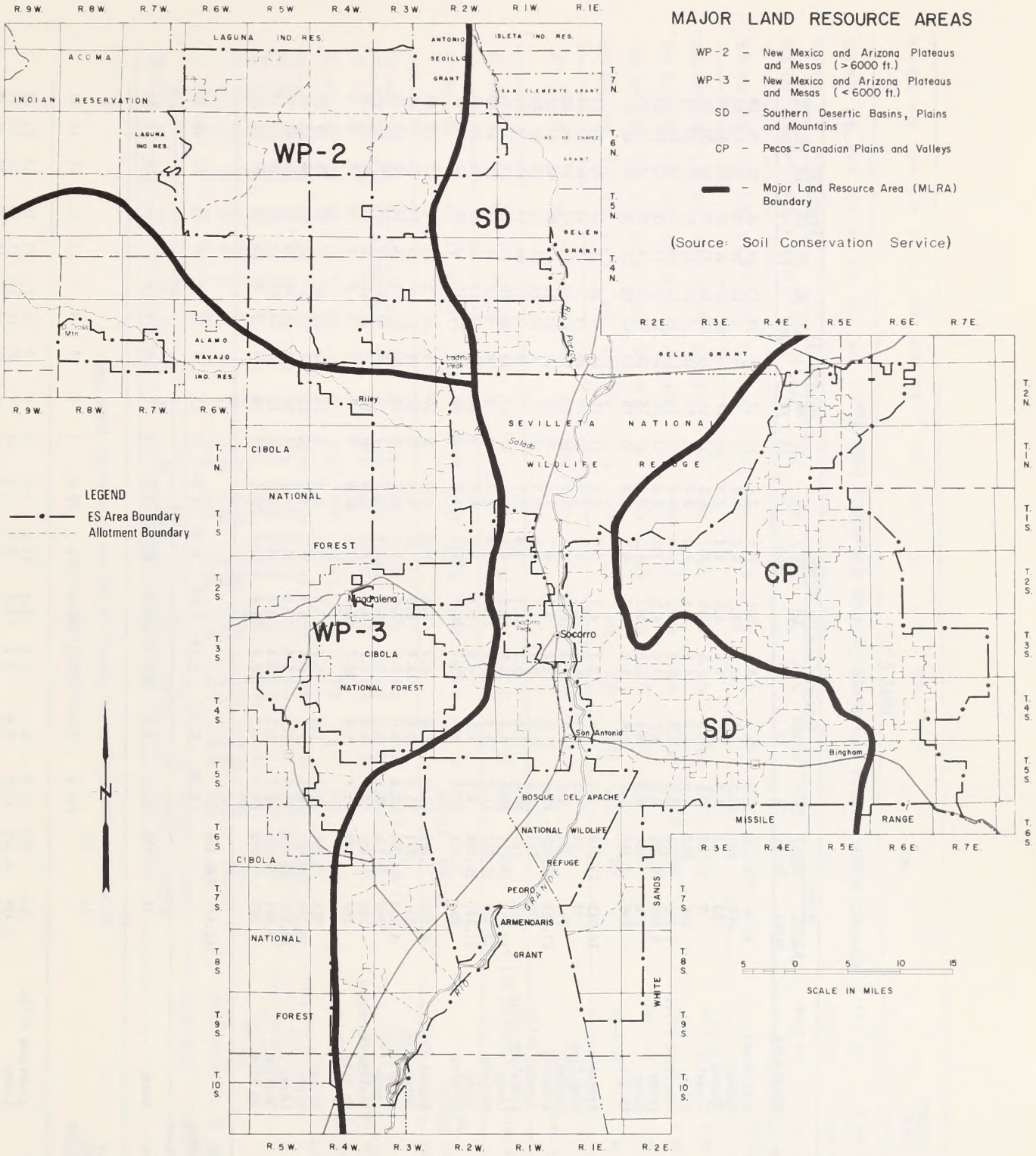
Pinyon-juniper is a woodland with unique characteristics because it forms a continuous belt (Visual B) across the ES Area and appears to separate the so-called 'cold desert' (Great Basin Desertshrub) from the 'hot desert' (Southwestern Desertshrub). Shrubs found within this vegetative type are also prominent in the Great Basin Desert. They are four-wing saltbush, sand sagebrush, rabbitbrush, snakeweed, wolfberry, desert olive, and winterfat. Creosotebush and desert sumac are adjacent to this type and characterize the Chihuahuan Desert. In addition, species characteristic of chaparral and grasslands are also in this type. Chaparral species include: apache-plume, hairy mountain mahogany, squawbush, scrub oak, and brickellbush. Grassland species include: blue grama, black grama, sideoats grama, sand dropseed, three-awn, galleta, fluffgrass, ring muhly, and sacaton.

The overstory in the pinyon-juniper type is usually formed by juniper, the most common being one-seed juniper; however, scattered alligator junipers do occur. Pinyon is much less common and is restricted to sites with more favorable moisture regimes. Stand density and size of the juniper and pinyon trees vary with precipitation, aspect, elevation, and soil type.

A shrub and grass understory usually occurs but varies with soil type and juniper density. It is believed that juniper litter inhibits the establishment and growth of understory species (Jameson, 1970). Major understory shrubs include: hairy mountain mahogany, Mormon tea, snakeweed, winterfat, sumac, and shrub liveoak. Common perennial grasses include: black grama, blue grama, galleta, sand dropseed, spike dropseed, three-awn, and muhlys. Black grama and blue grama are the key species which will be used to monitor the effects of the Proposed Action in the pinyon-juniper type.

#### *Grass*

The grass type covers 260,434 acres (20 percent) of the vegetation surveyed and consists of three subtypes: 1) a short grass dominated by blue grama, black grama, and galleta which is generally found on hills, ridges, and mesas; 2) a mid-grass dominated by alkali sacaton which dominates heavier soils in open valleys and re-




**MAP 2-2.** Major Land Resource Areas

TABLE 2-2

RESPONSES OF VEGETATION TO THE PROPOSED ACTION AND ALTERNATIVES (LONG TERM)



| Vegetative Type & MLRAs | Range Site | Acres | | Grazing Capacity AC/AUM | | | | | | Density (%) | | | | | Cover (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Public Acres | Total Acres | EE /4 | Potent /1 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG |
| Grassland, CP | Bottomland | 3,734 | 13,178 | 5.0 | 0.7 | 3.5 | 3.9 | 3.1 | 2.9 | 13 | 17 | 16 | 19 | 15 | 24 | 35 | 32 | 39 | 28 |
| | Gypsum | 266 | 266 | 10.3 | 7.7 | 10.3 | 10.3 | 9.2 | 7.7 | 8 | 8 | 8 | 9 | 10 | 39 | 39 | 39 | 43 | 48 |
| | Gypsum Hills | 53 | 53 | 4.6 | 3.5 | 4.6 | 4.6 | 4.1 | 3.5 | 14 | 14 | 14 | 16 | 17 | 31 | 31 | 31 | 34 | 38 |
| | Gravelly | 0 | 63 | 7.5 | 2.8 | 7.5 | 7.5 | 6.7 | 5.6 | 11 | 11 | 11 | 12 | 11 | 30 | 30 | 30 | 33 | 30 |
| | Hills | 282 | 842 | 4.5 | 3.7 | 4.5 | 4.5 | 4.0 | 3.4 | 15 | 15 | 15 | 17 | 16 | 31 | 31 | 31 | 34 | 33 |
| | Limestone Hills | 1,336 | 2,186 | 6.9 | 9.3 | 5.9 | 6.2 | 5.3 | 4.6 | 10 | 10 | 10 | 11 | 11 | 15 | 15 | 15 | 17 | 17 |
| | Loamy | 9,662 | 19,759 | 6.9 | 4.6 | 3.6 | 4.5 | 3.2 | 3.3 | 11 | 15 | 14 | 17 | 14 | 17 | 26 | 23 | 29 | 23 |
| | Sandy | 120 | 934 | 6.8 | 3.4 | 5.0 | 5.5 | 4.5 | 4.1 | 11 | 14 | 13 | 16 | 12 | 14 | 18 | 17 | 20 | 15 |
| | No Site | 495 | 1,147 | 5.2 | N/A | 5.2 | 5.2 | 4.6 | 3.9 | 18 | 18 | 18 | 20 | 20 | 56 | 56 | 56 | 62 | 62 |
| Grassland, SD | Bottomland | 14,012 | 21,314 | 7.7 | 1.2 | 3.7 | 4.7 | 3.3 | 3.6 | 11 | 15 | 14 | 17 | 15 | 19 | 23 | 22 | 26 | 24 |
| | Deep Sand | 13 | 13 | 5.1 | 5.5 | 5.1 | 5.1 | 4.5 | 3.8 | 10 | 10 | 10 | 11 | 12 | 19 | 19 | 19 | 21 | 24 |
| | Gypsum | 293 | 339 | 6.8 | 12.2 | 6.8 | 6.8 | 6.1 | 5.1 | 10 | 10 | 10 | 11 | 12 | 41 | 41 | 41 | 46 | 50 |
| | Gravelly | 23,355 | 35,439 | 11.0 | 11.0 | 9.2 | 9.7 | 8.2 | 7.3 | 9 | 10 | 10 | 11 | 11 | 43 | 46 | 45 | 51 | 52 |
| | Igneous Hills | 98 | 123 | 7.1 | 8.9 | 7.1 | 7.1 | 6.3 | 5.3 | 9 | 9 | 9 | 10 | 11 | 55 | 55 | 55 | 61 | 66 |
| | Limestone Hills | 119 | 122 | 15.4 | 7.0 | 9.9 | 11.3 | 8.8 | 8.5 | 6 | 10 | 9 | 11 | 11 | 60 | 67 | 65 | 74 | 80 |
| | Loamy | 13,752 | 17,021 | 11.0 | 4.4 | 5.5 | 6.9 | 4.9 | 5.2 | 11 | 14 | 13 | 16 | 15 | 27 | 30 | 29 | 33 | 34 |
| | Malpais | 14,452 | 16,612 | 11.2 | 5.1 | 11.2 | 11.2 | 10.0 | 8.4 | 8 | 8 | 8 | 9 | 10 | 57 | 57 | 57 | 63 | 69 |
| | Sandy | 31,131 | 36,895 | 8.1 | 4.5 | 4.8 | 5.7 | 4.3 | 4.2 | 9 | 12 | 11 | 13 | 13 | 20 | 25 | 24 | 28 | 28 |
| | No Site | 853 | 1,311 | 27.2 | N/A | 28.7 | 28.5 | 25.5 | 21.3 | 9 | 10 | 10 | 11 | 11 | 43 | 42 | 42 | 46 | 49 |
| Grassland, WP-2 | Basalt Hills | 2,155 | 3,261 | 11.9 | 1.9 | 6.7 | 8.1 | 6.0 | 6.0 | 6 | 10 | 9 | 11 | 9 | 37 | 46 | 43 | 51 | 48 |
| | Bottomland | 631 | 1,771 | 11.0 | 0.5 | 5.4 | 6.9 | 4.8 | 5.1 | 5 | 10 | 9 | 11 | 7 | 11 | 24 | 20 | 27 | 16 |
| | Loamy | 4,103 | 15,884 | 13.8 | 3.0 | 5.3 | 7.5 | 4.7 | 5.6 | 6 | 12 | 10 | 13 | 9 | 16 | 24 | 22 | 27 | 19 |
| | Sandy | 796 | 2,736 | 6.2 | 3.5 | 6.2 | 6.2 | 5.5 | 4.7 | 9 | 9 | 9 | 10 | 10 | 24 | 24 | 24 | 27 | 26 |
| | Shallow Sandstone | 260 | 484 | 4.7 | 4.4 | 4.7 | 4.7 | 4.2 | 3.5 | 16 | 16 | 16 | 18 | 18 | 34 | 34 | 34 | 37 | 38 |
| | No Site | 166 | 248 | 26.7 | N/A | 26.7 | 26.7 | 23.8 | 20.0 | 2 | 2 | 2 | 2 | 2 | 8 | 8 | 8 | 9 | 9 |
| Grassland, WP-3 | Gravelly | 865 | 3,006 | 10.7 | 1.5 | 5.7 | 7.0 | 5.1 | 5.3 | 8 | 14 | 12 | 16 | 10 | 21 | 26 | 25 | 29 | 24 |
| | Hills | 10,167 | 16,901 | 6.9 | 2.1 | 6.6 | 6.7 | 5.9 | 5.0 | 10 | 11 | 11 | 12 | 12 | 56 | 53 | 54 | 59 | 62 |
| | Loamy | 24,583 | 42,912 | 7.8 | 2.5 | 5.4 | 6.0 | 4.8 | 4.5 | 11 | 14 | 13 | 16 | 14 | 30 | 37 | 35 | 41 | 38 |
| | Shallow | 4,461 | 5,185 | 6.7 | 3.1 | 3.4 | 4.3 | 3.0 | 3.2 | 11 | 17 | 15 | 19 | 13 | 11 | 21 | 18 | 20 | 13 |
| | No Site | 328 | 429 | 29.4 | N/A | 29.4 | 29.4 | 26.2 | 22.1 | 8 | 8 | 8 | 9 | 9 | 26 | 26 | 26 | 28 | 31 |
| Grassland TOTAL AVERAGE | | 162,541 | 260,434 | 8.98 | 4.30 | 5.70 | 6.84 | 5.42 | 5.12 | 6 | 13 | 14 | 14 | 13 | 30 | 35 | 33 | 39 | 37 |
| Perennial Forb WP-2 | Loamy | 11 | 107 | 105.3 | 3.0 | 105.3 | 105.3 | 93.7 | 79.0 | 4 | 4 | 4 | 4 | 4 | 11 | 11 | 11 | 12 | 11 |
| Perennial Forb TOTAL AVERAGE | | 11 | 107 | 105.3 | 3.0 | 105.3 | 105.3 | 93.7 | 79.0 | 4 | 4 | 4 | 4 | 4 | 11 | 11 | 11 | 12 | 11 |
| Sagebrush CP | Limestone Hills | 193 | 193 | 11.9 | 9.3 | 11.9 | 11.9 | 10.6 | 8.9 | 9 | 9 | 9 | 10 | 11 | 19 | 19 | 19 | 21 | 24 |
| | Loamy | 1,796 | 2,109 | 11.2 | 4.6 | 7.1 | 8.2 | 6.3 | 6.1 | 11 | 17 | 15 | 19 | 18 | 14 | 20 | 18 | 22 | 21 |
| | Sandy | 5,914 | 7,870 | 8.5 | 3.4 | 7.2 | 7.5 | 6.4 | 5.7 | 10 | 12 | 11 | 13 | 13 | 13 | 19 | 17 | 21 | 19 |

TABLE 2-2 (continued)

RESPONSES OF VEGETATION TO THE PROPOSED ACTION AND ALTERNATIVES (LONG TERM)



| Vegetative Type & MLRAs | Range Site | Acres | | Grazing Capacity AC/AUM | | | | | | Density (%) | | | | | Cover (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Public Acres | Total Acres | EE /4 | Potent /1 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG |
| Sagebrush, SD | Bottomland | 547 | 703 | 10.4 | 1.2 | 10.3 | 10.3 | 9.2 | 7.7 | 8 | 8 | 8 | 9 | 9 | 14 | 14 | 14 | 16 | 17 |
| | Deep Sand | 13,697 | 15,995 | 45.6 | 5.5 | 45.6 | 45.6 | 40.6 | 34.2 | 7 | 7 | 7 | 8 | 8 | 11 | 11 | 11 | 12 | 13 |
| | Gypsum | 855 | 908 | 22.9 | 12.2 | 22.9 | 22.9 | 20.4 | 17.2 | 9 | 9 | 9 | 10 | 11 | 10 | 10 | 10 | 11 | 12 |
| | Gravelly | 43 | 43 | 4.2 | 11.1 | 4.2 | 4.2 | 3.7 | 3.2 | 16 | 16 | 16 | 18 | 20 | 21 | 21 | 21 | 23 | 26 |
| | Igneous Hills | 131 | 131 | 9.3 | 8.9 | 9.3 | 9.3 | 8.3 | 7.0 | 8 | 8 | 8 | 9 | 10 | 11 | 11 | 11 | 12 | 14 |
| | Sandy | 31,889 | 40,683 | 6.6 | 4.5 | 4.9 | 5.3 | 4.4 | 4.0 | 11 | 14 | 13 | 16 | 15 | 22 | 25 | 24 | 28 | 28 |
| | Shallow Sand | 678 | 749 | 14.7 | 5.4 | 14.7 | 14.7 | 13.1 | 11.0 | 6 | 6 | 6 | 7 | 7 | 26 | 26 | 26 | 29 | 32 |
| Sagebrush, WP-2 | Malpais | 358 | 572 | 13.3 | 2.6 | 13.3 | 13.3 | 11.8 | 10.0 | 10 | 10 | 10 | 11 | 12 | 30 | 30 | 30 | 33 | 35 |
| Sagebrush, WP-3 | Hills | 194 | 426 | 10.6 | 2.1 | 8.3 | 8.9 | 7.4 | 6.7 | 10 | 10 | 10 | 11 | 11 | 41 | 20 | 26 | 22 | 37 |
| | Loamy | 58 | 58 | 83.3 | 2.5 | N/A | N/A | N/A | N/A | 3 | N/A | N/A | N/A | N/A | 4 | N/A | N/A | N/A | N/A |
| | Sandy | 1,012 | 1,012 | 12.4 | 2.9 | N/A | N/A | N/A | N/A | 8 | N/A | N/A | N/A | N/A | 8 | N/A | N/A | N/A | N/A |
| Sagebrush TOTALS AVERAGE | | 57,365 | 71,452 | 16.24 | 4.65 | 14.98 | 15.28 | 13.36 | 11.48 | 10 | 12 | 11 | 14 | 13 | 18 | 21 | 20 | 23 | 23 |
| Mountain Shrub, CP | Limestone Hills | 95 | 192 | 15.6 | 9.3 | 15.6 | 15.6 | 13.9 | 11.7 | 10 | 10 | 10 | 11 | 11 | 29 | 29 | 29 | 32 | 32 |
| Mountain Shrub TOTALS AVERAGE | | 95 | 192 | 15.6 | 9.3 | 15.6 | 15.6 | 13.9 | 11.7 | 10 | 10 | 10 | 11 | 11 | 29 | 29 | 29 | 32 | 32 |
| Waste, CP | No Site | 515 | 515 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Waste, SD | No Site | 0 | 55 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Waste, WP-2 | No Site | 2,134 | 2,607 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Waste, WP-3 | No Site | 3,681 | 4,811 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Waste TOTALS | | 6,330 | 7,988 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Barren, SD | No Site | 44 | 44 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Barren, WP-2 | No Site | 20 | 69 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Barren, WP-3 | No Site | 281 | 809 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Barren TOTAL AVERAGE | | 345 | 922 | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A | N/A |

TABLE 2-2 (continued)

RESPONSES OF VEGETATION TO THE PROPOSED ACTION ANO ALTERNATIVES (LONG TERM)



| Vegetative Type & MLRAs | Range Site | Acres: Public Acres | Acres: Total Acres | Grazing Capacity AC/AUM: EE /4 | Grazing Capacity AC/AUM: Potent /1 | Grazing Capacity AC/AUM: PA /4 | Grazing Capacity AC/AUM: LA | Grazing Capacity AC/AUM: PCL/ ESR | Grazing Capacity AC/AUM: NG | Oensity (%): EE /4 | Oensity (%): PA /4 | Oensity (%): LA | Oensity (%): PCL/ ESR | Oensity (%): NG | Cover (%): EE /4 | Cover (%): PA /4 | Cover (%): LA | Cover (%): PCL/ ESR | Cover (%): NG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pinyon-juniper, CP | Bottomland | 105 | 1,206 | 10.0 | 0.7 | 10.2 | 10.1 | 9.1 | 7.6 | 8 | 8 | 8 | 9 | 8 | 20 | 20 | 20 | 22 | 20 |
| | Gypsum | 16,786 | 36,640 | 13.8 | 10.9 | 8.4 | 9.8 | 7.5 | 7.4 | 9 | 11 | 10 | 12 | 11 | 24 | 28 | 27 | 31 | 28 |
| | Gypsum Hills | 9,546 | 12,790 | 71.6 | 7.5 | 71.6 | 71.6 | 63.7 | 53.7 | 7 | 7 | 7 | 8 | 8 | 30 | 30 | 30 | 33 | 35 |
| | Gravelly | 3,015 | 4,517 | 12.7 | 2.8 | 12.7 | 12.7 | 11.3 | 9.5 | 7 | 7 | 7 | 8 | 8 | 50 | 50 | 50 | 56 | 58 |
| | Hills | 12,573 | 15,725 | 15.7 | 3.7 | 15.5 | 15.6 | 13.8 | 11.7 | 9 | 9 | 9 | 10 | 11 | 60 | 64 | 63 | 71 | 74 |
| | Limestone Hills | 36,611 | 49,418 | 13.4 | 9.3 | 9.5 | 10.5 | 8.5 | 7.9 | 8 | 9 | 9 | 10 | 10 | 47 | 51 | 50 | 57 | 58 |
| | Loamy | 13,235 | 21,407 | 13.9 | 4.6 | 6.7 | 8.6 | 6.0 | 6.4 | 9 | 12 | 11 | 13 | 12 | 35 | 46 | 43 | 51 | 46 |
| | Malpais | 782 | 1,135 | 3.6 | 3.5 | 3.6 | 3.6 | 3.2 | 2.7 | 17 | 17 | 17 | 19 | 20 | 38 | 38 | 38 | 42 | 44 |
| | Sandy | 15,373 | 19,969 | 19.7 | 3.4 | 8.1 | 11.1 | 7.2 | 8.3 | 8 | 11 | 10 | 12 | 12 | 30 | 39 | 36 | 43 | 42 |
| | Shallow | 16,172 | 22,669 | 10.8 | 3.6 | 6.4 | 7.5 | 5.7 | 5.7 | 8 | 10 | 9 | 11 | 11 | 48 | 53 | 52 | 59 | 59 |
| | No Site | 199 | 224 | 6.8 | N/A | 6.8 | 6.8 | 6.1 | 5.1 | 11 | 11 | 11 | 12 | 13 | 51 | 49 | 50 | 55 | 60 |
| Pinyon-juniper, SD | Oeep Sand | 4,561 | 13,703 | 23.8 | 5.5 | 24.2 | 24.1 | 21.5 | 18.1 | 6 | 6 | 6 | 7 | 6 | 21 | 21 | 21 | 23 | 23 |
| | Gypsum | 46 | 104 | 38.2 | 12.2 | 38.2 | 38.2 | 34.0 | 28.7 | 6 | 6 | 6 | 7 | 7 | 16 | 16 | 16 | 18 | 18 |
| | Gravelly | 3,448 | 8,355 | 121.1 | 11.1 | 121.1 | 121.1 | 107.8 | 90.8 | 5 | 5 | 5 | 6 | 5 | 26 | 26 | 26 | 29 | 29 |
| | Igneous Hills | 820 | 3,203 | 16.5 | 8.9 | 16.5 | 16.5 | 14.7 | 12.4 | 7 | 7 | 7 | 8 | 7 | 23 | 23 | 23 | 26 | 24 |
| | Limestone Hills | 3,532 | 4,522 | 16.0 | 7.0 | 12.5 | 13.4 | 11.1 | 10.1 | 11 | 11 | 11 | 12 | 13 | 66 | 72 | 70 | 80 | 82 |
| | Loamy | 354 | 381 | 4.9 | 4.4 | 4.9 | 4.9 | 4.4 | 3.7 | 16 | 16 | 16 | 18 | 20 | 41 | 41 | 41 | 46 | 50 |
| | Malpais | 349 | 836 | 24.6 | 5.1 | 24.6 | 24.6 | 21.9 | 18.5 | 6 | 6 | 6 | 7 | 7 | 51 | 51 | 51 | 57 | 56 |
| | Sandy | 381 | 2,031 | 20.2 | 4.5 | 20.2 | 20.2 | 18.0 | 15.2 | 6 | 6 | 6 | 7 | 6 | 25 | 25 | 25 | 28 | 26 |
| | No Site | 694 | 802 | 9.4 | N/A | 9.4 | 9.4 | 8.4 | 7.1 | 11 | 11 | 11 | 12 | 13 | 55 | 55 | 55 | 61 | 66 |
| Pinyon-juniper, WP-2 | Basalt Hills | 8,036 | 21,243 | 10.5 | 1.9 | 10.5 | 10.5 | 9.3 | 7.9 | 8 | 8 | 8 | 9 | 9 | 33 | 33 | 33 | 36 | 36 |
| | Limestone Hills | 6,301 | 14,964 | 14.4 | 3.5 | 13.2 | 13.5 | 11.7 | 10.1 | 7 | 8 | 8 | 9 | 8 | 44 | 45 | 45 | 50 | 49 |
| | Loamy | 2,218 | 6,400 | 11.7 | 3.0 | 7.2 | 8.4 | 6.4 | 6.3 | 8 | 12 | 11 | 13 | 10 | 27 | 38 | 35 | 42 | 33 |
| | Malpais | 9,751 | 23,381 | 10.9 | 2.6 | 9.8 | 10.1 | 8.7 | 7.6 | 9 | 9 | 9 | 10 | 10 | 38 | 45 | 43 | 50 | 44 |
| | Sandstone Hills | 1,492 | 4,833 | 38.0 | 3.4 | 38.0 | 38.0 | 33.8 | 28.5 | 7 | 7 | 7 | 8 | 8 | 47 | 47 | 47 | 52 | 50 |
| | Sandy | 8,174 | 16,640 | 12.2 | 3.5 | 12.2 | 12.2 | 10.9 | 9.2 | 7 | 7 | 7 | 8 | 8 | 15 | 15 | 15 | 17 | 17 |
| | Shallow Sandstone | 6,724 | 17,796 | 11.8 | 3.9 | 11.8 | 11.8 | 10.5 | 8.9 | 7 | 7 | 7 | 8 | 8 | 35 | 35 | 35 | 39 | 38 |
| | No Site | 2,771 | 8,533 | 19.6 | N/A | 19.6 | 19.6 | 17.4 | 14.7 | 6 | 6 | 6 | 7 | 6 | 50 | 50 | 50 | 56 | 54 |
| Pinyon-juniper, WP-3 | Basalt Hills | 1,144 | 1,333 | 6.4 | 1.9 | 6.6 | 6.5 | 5.9 | 4.9 | 12 | 12 | 12 | 13 | 14 | 53 | 53 | 53 | 59 | 64 |
| | Gravelly | 21,186 | 30,617 | 9.7 | 1.5 | 6.8 | 7.6 | 6.1 | 5.7 | 9 | 12 | 11 | 13 | 12 | 50 | 53 | 52 | 59 | 60 |
| | Hills | 33,950 | 46,712 | 9.9 | 2.1 | 4.2 | 5.7 | 3.7 | 4.3 | 11 | 16 | 15 | 18 | 16 | 43 | 47 | 46 | 52 | 53 |
| | Limestone Hills | 20,620 | 30,956 | 16.6 | 3.5 | 8.0 | 10.2 | 7.1 | 7.7 | 9 | 12 | 11 | 13 | 12 | 63 | 67 | 66 | 74 | 75 |
| | Loamy | 39,558 | 45,607 | 17.9 | 2.5 | 18.9 | 18.6 | 16.8 | 14.0 | 7 | 8 | 8 | 9 | 9 | 40 | 40 | 40 | 45 | 48 |
| | Malpais | 561 | 561 | 26.7 | 2.6 | N/A | N/A | N/A | N/A | 6 | N/A | N/A | N/A | N/A | 19 | N/A | N/A | N/A | N/A |
| | Shallow | 16,582 | 20,2B3 | 12.8 | 3.5 | 9.8 | 10.6 | 8.7 | 7.9 | 9 | 11 | 10 | 12 | 12 | 50 | 54 | 53 | 60 | 63 |
| | No Site | 225 | 599 | 5.9 | N/A | 5.9 | 5.9 | 5.3 | 4.4 | 13 | 13 | 13 | 14 | 14 | 43 | 43 | 43 | 48 | 47 |
| Pinyon-juniper TOTAL | | 317,875 | 510,095 | | | | | | | | | | | | | | | | |
| AVERAGE | | | | 17.23 | 4.56 | 14.08 | 14.89 | 12.53 | 11.19 | 8 | 10 | 10 | 11 | 11 | 41 | 44 | 43 | 49 | 49 |
| Broadleaf, SO | Gravelly | 63 | 224 | 3.4 | 11.1 | 3.4 | 3.4 | 3.0 | 2.6 | 19 | 19 | 19 | 21 | 20 | 92 | 92 | 92 | 102 | 98 |
| | No Site | 255 | 8,874 | 0.1 | N/A | 0.1 | 0.1 | 0.1 | 0.1 | 1 | 1 | 1 | 1 | 1 | 2 | 2 | 2 | 2 | 2 |
| Broadleaf, WP-2 | No Site | 36 | 122 | 22.9 | N/A | 22.9 | 22.9 | 20.4 | 17.2 | 4 | 4 | 4 | 4 | 4 | 5 | 5 | 5 | 6 | 5 |
| Broadleaf, WP-3 | No Site | 3,205 | 5,649 | 47.3 | N/A | 47.5 | 47.4 | 42.3 | 35.6 | 5 | 5 | 5 | 6 | 6 | 11 | 11 | 11 | 12 | 12 |
| Broadleaf TOTAL | | 3,559 | 14,869 | | | | | | | | | | | | | | | | |
| AVERAGE | | | | 18.27 | 11.1 | 18.34 | 18.31 | 16.34 | 13.7 | 2.82 | 2.82 | 3 | 3 | 3 | 7 | 7 | 7 | 7 | 7 |

TABLE 2-2 (continued)

RESPONSES OF VEGETATION TO THE PROPOSED ACTION AND ALTERNATIVES (LONG TERM)



| Vegetative Type & MLRAs | Range Site | Acres | | Grazing Capacity AC/AUM | | | | | | Density (%) | | | | | Cover (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Public Acres | Total Acres | EE /4 | Potent /1 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG |
| Creosote, CP | Gypsum | 122 | 174 | 31.3 | 10.9 | 31.3 | 31.3 | 27.9 | 23.5 | 6 | 6 | 6 | 7 | 7 | 31 | 31 | 31 | 34 | 36 |
| | Gypsum Hills | 167 | 450 | 19.2 | 7.5 | 19.2 | 19.2 | 17.1 | 14.4 | 4 | 4 | 4 | 4 | 4 | 22 | 22 | 22 | 24 | 24 |
| | Gravelly | 871 | 991 | 157.9 | 2.8 | 157.9 | 157.9 | 140.5 | 118.4 | 6 | 6 | 6 | 7 | 7 | 72 | 72 | 72 | 89 | 87 |
| | Hills | 274 | 963 | 10.2 | 3.7 | 10.7 | 10.6 | 9.5 | 7.9 | 13 | 13 | 13 | 14 | 14 | 17 | 17 | 17 | 19 | 18 |
| | Limestone Hills | 3,545 | 4,093 | 23.7 | 9.3 | 23.7 | 23.7 | 21.1 | 17.8 | 9 | 9 | 9 | 10 | 11 | 56 | 56 | 56 | 62 | 68 |
| | Loamy | 319 | 1,009 | 292.8 | 4.6 | 292.8 | 292.8 | 260.6 | 219.6 | 3 | 3 | 3 | 3 | 3 | 31 | 31 | 31 | 34 | 33 |
| | Sandy | 18 | 18 | 35.7 | 3.4 | 35.7 | 35.7 | 31.8 | 26.8 | 3 | 3 | 3 | 3 | 4 | 16 | 16 | 16 | 18 | 20 |
| Creosote, SD | Bottomland | 30 | 184 | 12.5 | 1.2 | 12.5 | 12.5 | 11.1 | 9.4 | 11 | 11 | 11 | 12 | 11 | 31 | 31 | 31 | 34 | 32 |
| | Deep Sand | 755 | 768 | 47.6 | 5.5 | 47.6 | 47.6 | 42.4 | 35.7 | 6 | 6 | 6 | 7 | 7 | 32 | 32 | 32 | 35 | 40 |
| | Gravelly | 120,308 | 156,322 | 75.9 | 11.1 | 55.0 | 60.4 | 49.0 | 45.3 | 6 | 8 | 7 | 9 | 8 | 58 | 58 | 58 | 65 | 69 |
| | Igneous Hills | 3,491 | 4,253 | 13.7 | 8.9 | 13.0 | 13.2 | 11.6 | 9.9 | 8 | 8 | 8 | 9 | 10 | 62 | 62 | 62 | 69 | 78 |
| | Limestone Hills | 15,181 | 18,562 | 20.6 | 7.0 | 15.0 | 16.5 | 13.4 | 12.3 | 9 | 10 | 10 | 11 | 11 | 61 | 62 | 62 | 68 | 74 |
| | Loamy | 2,450 | 3,262 | 10.8 | 4.4 | 6.2 | 7.4 | 5.5 | 5.5 | 13 | 17 | 16 | 19 | 18 | 33 | 38 | 37 | 42 | 42 |
| | Sandy | 6,850 | 7,881 | 29.2 | 4.5 | 16.3 | 19.7 | 14.5 | 14.7 | 6 | 8 | 7 | 9 | 9 | 40 | 47 | 45 | 52 | 54 |
| | No Site | 3,192 | 4,605 | 39.2 | N/A | 39.2 | 39.2 | 34.9 | 29.4 | 7 | 7 | 7 | 8 | 8 | 47 | 47 | 47 | 52 | 55 |
| Creosote, WP-3 | Gravelly | 4,519 | 5,991 | 32.0 | 1.5 | 21.8 | 24.5 | 19.4 | 18.3 | 6 | 7 | 7 | 8 | 8 | 46 | 48 | 47 | 53 | 56 |
| | Hills | 216 | 248 | 36.7 | 2.1 | 36.7 | 36.7 | 32.7 | 27.5 | 7 | 7 | 7 | 8 | 8 | 49 | 49 | 49 | 55 | 59 |
| | Limestone Hills | 1,979 | 1,979 | 29.1 | 3.5 | 29.1 | 29.1 | 25.9 | 21.8 | 5 | 5 | 5 | 6 | 6 | 79 | 79 | 79 | 88 | 98 |
| | No Site | 12 | 30 | 28.5 | N/A | 28.5 | 28.5 | 25.4 | 21.4 | 9 | 9 | 9 | 10 | 10 | 58 | 58 | 58 | 65 | 64 |
| Creosote TOTAL AVERAGE | | 164,299 | 211,783 | 64.32 | 9.79 | 47.56 | 51.90 | 42.37 | 38.91 | 7 | 8 | 7 | 9 | 9 | 56 | 57 | 57 | 64 | 68 |
| Mesquite, SD | Deep Sand | 1,132 | 2,007 | 19.7 | 5.5 | 16.1 | 17.0 | 14.3 | 12.8 | 16 | 16 | 16 | 18 | 18 | 36 | 36 | 36 | 40 | 41 |
| | Gravelly | 1,822 | 2,955 | 48.8 | 11.1 | 48.8 | 48.8 | 43.4 | 36.6 | 13 | 13 | 13 | 14 | 15 | 38 | 38 | 38 | 42 | 44 |
| | Loamy | 82 | 82 | 5.8 | 4.4 | 5.8 | 5.8 | 5.2 | 4.4 | 10 | 10 | 10 | 11 | 12 | 75 | 75 | 75 | 83 | 93 |
| | Sandy | 5,320 | 6,944 | 9.3 | 4.5 | 4.8 | 6.0 | 4.3 | 4.5 | 10 | 14 | 13 | 16 | 15 | 30 | 34 | 33 | 37 | 38 |
| | No Site | 743 | 1,566 | 17.6 | N/A | 17.6 | 17.6 | 15.7 | 13.2 | 9 | 9 | 9 | 10 | 10 | 50 | 50 | 50 | 55 | 56 |
| Mesquite, WP-2 | Basalt Hills | 5,760 | 7,467 | 8.0 | 1.9 | 8.0 | 8.0 | 7.1 | 6.0 | 10 | 10 | 10 | 11 | 12 | 34 | 34 | 34 | 37 | 40 |
| Mesquite, WP-3 | Gravelly | 182 | 182 | 5.8 | 1.5 | 3.8 | 4.3 | 3.4 | 3.2 | 10 | 15 | 14 | 17 | 17 | 75 | 80 | 79 | 89 | 97 |
| | Loamy | 317 | 4,024 | 11.7 | 2.5 | 11.7 | 11.7 | 10.4 | 8.8 | 8 | 8 | 8 | 9 | 8 | 41 | 41 | 41 | 46 | 42 |
| | Shallow | 86 | 132 | 20.8 | 3.5 | 20.8 | 20.8 | 18.5 | 15.6 | 6 | 6 | 6 | 7 | 7 | 45 | 45 | 45 | 50 | 52 |
| Mesquite TOTAL AVERAGE | | 15,444 | 25,359 | 15.26 | 4.22 | 13.73 | 14.13 | 12.21 | 10.61 | 10 | 12 | 11 | 13 | 13 | 36 | 37 | 37 | 41 | 42 |
| Saltbush, CP | Bottomland | 184 | 236 | 3.9 | 0.7 | 3.9 | 3.9 | 3.5 | 2.9 | 15 | 15 | 15 | 17 | 18 | 41 | 41 | 41 | 46 | 49 |
| | Gypsum Hills | 986 | 1,487 | 13.3 | 7.5 | 13.3 | 13.3 | 11.8 | 10.0 | 10 | 10 | 10 | 11 | 12 | 25 | 25 | 25 | 28 | 29 |
| | Loamy | 356 | 658 | 8.6 | 4.6 | 10.7 | 10.2 | 9.5 | 7.6 | 10 | 8 | 9 | 9 | 10 | 20 | 15 | 16 | 17 | 20 |
| Saltbush, SD | Deep Sand | 836 | 836 | 10.4 | 5.5 | 10.4 | 10.4 | 9.3 | 7.8 | 9 | 9 | 9 | 10 | 11 | 20 | 20 | 20 | 22 | 25 |
| | Gypsum | 127 | 305 | 320.0 | 12.2 | 320.0 | 320.0 | 284.8 | 240.0 | 6 | 6 | 6 | 7 | 7 | 9 | 9 | 9 | 10 | 10 |
| | Gravelly | 0 | 165 | 24.4 | 11.1 | 24.4 | 24.4 | 21.7 | 18.3 | 3 | 3 | 3 | 3 | 3 | 27 | 27 | 27 | 30 | 27 |
| | Loamy | 3,435 | 4,628 | 21.2 | 4.4 | 19.3 | 19.8 | 17.2 | 14.8 | 6 | 7 | 7 | 8 | 8 | 18 | 18 | 18 | 20 | 21 |
| | Sandy | 756 | 756 | 13.3 | 4.5 | 13.3 | 13.3 | 11.8 | 10.0 | 9 | 9 | 9 | 10 | 11 | 37 | 37 | 37 | 41 | 46 |
| | No Site | 1,065 | 1,065 | 14.8 | N/A | 14.8 | 14.8 | 13.2 | 11.1 | 8 | 8 | 8 | 9 | 10 | 47 | 47 | 47 | 52 | 58 |

TABLE 2-2 (continued)

RESPONSES OF VEGETATION TO THE PROPOSED ACTION AND ALTERNATIVES (LONG TERM)



| Vegetative Type & MLRAs | Range Site | Acres | | Grazing Capacity AC/AUM | | | | | | Density (%) | | | | | Cover (%) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Public Acres | Total Acres | EE /4 | Potent /1 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG | EE /4 | PA /4 | LA | PCL/ ESR | NG |
| Saltbush, WP-2 | Bottomland | 5,338 | 9,924 | 10.6 | 0.7 | 6.3 | 7.4 | 5.6 | 5.6 | 7 | 12 | 11 | 13 | 10 | 16 | 25 | 22 | 28 | 22 |
| | Loamy | 6,179 | 11,759 | 13.9 | 3.0 | 5.8 | 7.9 | 5.2 | 5.9 | 7 | 13 | 11 | 14 | 11 | 15 | 22 | 20 | 24 | 20 |
| | Sandy | 907 | 2,428 | 8.9 | 3.5 | 8.9 | 8.9 | 7.9 | 6.7 | 8 | 8 | 8 | 9 | 9 | 15 | 15 | 15 | 17 | 16 |
| Saltbush, WP-3 | Bottomland | 85 | 436 | 106.7 | 0.5 | 106.7 | 106.7 | 95.0 | 80.0 | 1 | 1 | 1 | 1 | 1 | 6 | 6 | 6 | 7 | 6 |
| | Loamy | 3,333 | 6,307 | 12.0 | 2.5 | 4.1 | 6.2 | 3.6 | 4.6 | 10 | 17 | 15 | 19 | 15 | 23 | 32 | 29 | 35 | 30 |
| | Sandy | 0 | 1,272 | 13.0 | 2.9 | 13.0 | 13.0 | 11.6 | 9.8 | 7 | 7 | 7 | 8 | 7 | 11 | 11 | 11 | 12 | 11 |
| | Shallow | 422 | 627 | 14.0 | 3.5 | 14.0 | 14.0 | 12.5 | 10.5 | 7 | 7 | 7 | 8 | 8 | 14 | 14 | 14 | 16 | 16 |
| | No Site | 438 | 1,058 | 5.3 | N/A | 5.3 | 5.3 | 4.7 | 4.0 | 15 | 15 | 15 | 17 | 16 | 33 | 33 | 33 | 36 | 36 |
| Saltbush TOTAL AVERAGE | | 24,447 | 43,947 | 16.02 | 2.89 | 11.58 | 12.74 | 10.31 | 9.55 | 8 | 11 | 11 | 13 | 11 | 19 | 24 | 22 | 26 | 24 |
| Winterfat, CP | Limestone Hills | 97 | 97 | 4.6 | 9.3 | 4.6 | 4.6 | 4.1 | 3.5 | 14 | 14 | 14 | 16 | 17 | 47 | 47 | 47 | 52 | 58 |
| Winterfat, WP-2 | Loamy | 622 | 1,490 | 8.8 | 3.0 | 7.1 | 7.5 | 6.3 | 5.7 | 12 | 15 | 14 | 17 | 14 | 23 | 34 | 31 | 37 | 29 |
| Winterfat, WP-3 | Gravelly | 219 | 220 | 26.7 | 1.5 | 14.9 | 18.0 | 13.3 | 13.5 | 5 | 8 | 7 | 9 | 9 | 14 | 20 | 18 | 22 | 23 |
| | Malpais | 233 | 233 | 4.9 | 2.6 | 4.9 | 4.9 | 4.4 | 3.7 | 13 | 13 | 13 | 14 | 16 | 13 | 13 | 13 | 14 | 16 |
| | Shallow | 356 | 356 | 9.1 | 3.5 | 9.1 | 9.1 | 8.1 | 6.8 | 12 | 12 | 12 | 13 | 15 | 16 | 16 | 16 | 18 | 20 |
| Winterfat TOTAL AVERAGE | | 1,527 | 2,396 | 9.94 | 3.15 | 7.80 | 8.33 | 6.94 | 6.30 | 12 | 14 | 13 | 15 | 14 | 21 | 29 | 26 | 31 | 27 |
| Desert Shrub, CP | Bottomland | 0 | 211 | 5.8 | 0.7 | 4.0 | 4.5 | 3.6 | 3.4 | 11 | 14 | 13 | 16 | 11 | 21 | 24 | 23 | 27 | 21 |
| | Gypsum | 77 | 473 | 8.4 | 10.9 | 5.3 | 6.1 | 4.7 | 4.6 | 10 | 12 | 11 | 13 | 11 | 23 | 25 | 24 | 28 | 24 |
| | Gypsum Hills | 721 | 882 | 249.7 | 7.5 | 249.7 | 249.7 | 222.2 | 187.3 | 3 | 3 | 3 | 3 | 4 | 28 | 28 | 28 | 31 | 33 |
| | Hills | 2,121 | 3,466 | 17.8 | 3.7 | 17.8 | 17.8 | 15.9 | 13.4 | 12 | 12 | 12 | 13 | 14 | 24 | 24 | 24 | 27 | 28 |
| | Limestone Hills | 335 | 344 | 8.0 | 9.3 | 8.6 | 8.4 | 7.7 | 6.3 | 13 | 14 | 14 | 16 | 17 | 51 | 60 | 57 | 67 | 71 |
| | Loamy | 6,962 | 16,230 | 11.1 | 4.6 | 9.3 | 9.8 | 8.3 | 7.3 | 10 | 11 | 11 | 12 | 11 | 25 | 26 | 26 | 29 | 28 |
| | Malpais | 1,952 | 2,177 | 7.3 | 3.5 | 7.3 | 7.3 | 6.5 | 5.5 | 9 | 9 | 9 | 10 | 11 | 28 | 28 | 28 | 31 | 34 |
| | Sandy | 1,018 | 1,686 | 5.5 | 3.4 | 3.8 | 4.2 | 3.4 | 3.2 | 13 | 17 | 16 | 19 | 17 | 19 | 30 | 27 | 33 | 28 |
| | Shallow | 9 | 76 | 5.4 | 3.6 | 5.4 | 5.4 | 4.8 | 4.1 | 13 | 13 | 13 | 14 | 13 | 33 | 33 | 33 | 36 | 34 |
| | No Site | 6 | 340 | 41.7 | N/A | 41.7 | 41.7 | 37.1 | 31.3 | 2 | 2 | 2 | 2 | 2 | 7 | 7 | 7 | 8 | 7 |
| Desert Shrub, SO | Bottomland | 0 | 188 | 11.9 | 1.2 | 11.9 | 11.9 | 10.6 | 8.9 | 9 | 9 | 9 | 10 | 9 | 23 | 23 | 23 | 26 | 23 |
| | Deep Sand | 4,158 | 4,214 | 41.4 | 5.5 | 41.4 | 41.4 | 36.8 | 31.1 | 8 | 8 | 8 | 9 | 9 | 23 | 23 | 23 | 26 | 26 |
| | Gypsum | 4,879 | 7,918 | 19.0 | 12.2 | 19.0 | 19.0 | 16.9 | 14.3 | 8 | 8 | 8 | 9 | 9 | 16 | 16 | 16 | 18 | 18 |
| | Gravelly | 8,482 | 10,851 | 50.6 | 11.1 | 39.5 | 42.4 | 35.2 | 31.8 | 7 | 7 | 7 | 8 | 8 | 48 | 49 | 49 | 55 | 58 |
| | Limestone Hills | 3,066 | 3,768 | 12.9 | 7.0 | 12.9 | 12.9 | 11.5 | 9.7 | 9 | 9 | 9 | 10 | 11 | 54 | 54 | 54 | 60 | 65 |
| | Loamy | 7,026 | 8,364 | 8.0 | 4.4 | 8.0 | 8.0 | 7.1 | 6.0 | 11 | 11 | 11 | 12 | 12 | 27 | 27 | 27 | 30 | 30 |
| | Sandy | 27,937 | 41,298 | 10.3 | 4.5 | 6.2 | 7.3 | 5.5 | 5.4 | 11 | 14 | 13 | 16 | 15 | 25 | 31 | 29 | 34 | 33 |
| | No Site | 4,625 | 7,209 | 54.3 | N/A | 50.4 | 51.4 | 44.9 | 38.6 | 5 | 5 | 5 | 6 | 6 | 37 | 37 | 37 | 41 | 43 |
| Desert Shrub, WP-2 | Basalt Hills | 68 | 1,143 | 6.5 | 1.9 | 6.5 | 6.5 | 5.8 | 4.9 | 10 | 10 | 10 | 11 | 10 | 36 | 36 | 36 | 40 | 37 |
| | Loamy | 2,533 | 10,771 | 8.0 | 3.0 | 5.6 | 6.2 | 5.0 | 4.7 | 11 | 14 | 13 | 16 | 12 | 25 | 31 | 29 | 34 | 29 |
| | Malpais | 9,463 | 21,819 | 7.7 | 2.6 | 5.9 | 6.4 | 5.3 | 4.8 | 10 | 12 | 11 | 13 | 11 | 34 | 43 | 40 | 48 | 28 |
| | Sandy | 460 | 1,420 | 12.3 | 3.5 | 12.3 | 12.3 | 10.9 | 9.2 | 7 | 7 | 7 | 8 | 8 | 17 | 17 | 17 | 19 | 18 |
| | Shallow Sandstone | 0 | 7 | 10.0 | 4.4 | 10.0 | 10.0 | 8.9 | 7.5 | 10 | 10 | 10 | 11 | 10 | 46 | 46 | 46 | 51 | 46 |

TABLE 2-2 (continued)

RESPONSES OF VEGETATION TO THE PROPOSEO ACTION ANO ALTERNATIVES (LONG TERM)



| Vegetative Type & MLRAs | Range Site | Acres Public Acres | Acres Total Acres | Grazing Capacity AC/AUM EE /4 | Potent /1 | PA /4 | LA | PCL/ ESR | NG | Oensity (%) EE /4 | PA /4 | LA | PCL/ ESR | NG | Cover (%) EE /4 | PA /4 | LA | PCL/ ESR | NG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Oesert Shrub, WP-3 | Basalt Hills | 1,949 | 2,867 | 7.9 | 1.9 | 8.1 | 8.1 | 7.2 | 6.0 | 8 | 8 | 8 | 9 | 9 | 10 | 10 | 10 | 11 | 12 |
| | Gravelly | 0 | 33 | 4.0 | 1.5 | 4.0 | 4.0 | 3.6 | 3.0 | 17 | 17 | 17 | 19 | 17 | 57 | 57 | 57 | 63 | 57 |
| | Hills | 3,119 | 3,202 | 5.6 | 2.1 | 3.0 | 3.7 | 2.7 | 2.8 | 12 | 16 | 15 | 18 | 18 | 44 | 40 | 41 | 45 | 51 |
| | Limestone Hills | 186 | 370 | 18.3 | 3.5 | 18.3 | 18.3 | 16.3 | 13.7 | 5 | 5 | 5 | 6 | 6 | 50 | 50 | 50 | 55 | 56 |
| | Loamy | 7,617 | 12,415 | 14.1 | 2.5 | 9.2 | 10.5 | 8.2 | 7.9 | 9 | 13 | 12 | 14 | 12 | 33 | 37 | 36 | 41 | 40 |
| | Malpais | 1,444 | 3,708 | 10.0 | 2.6 | 10.0 | 10.0 | 8.9 | 7.5 | 8 | 8 | 8 | 9 | 9 | 32 | 32 | 32 | 35 | 35 |
| | Shallow | 1,142 | 1,231 | 9.1 | 3.5 | 6.8 | 7.4 | 6.1 | 5.5 | 13 | 16 | 15 | 18 | 18 | 24 | 16 | 18 | 18 | 23 |
| | No Site | 462 | 709 | 27.9 | N/A | 27.9 | 27.9 | 24.8 | 20.9 | 15 | 15 | 15 | 17 | 17 | 49 | 49 | 49 | 55 | 57 |
| Oesert Shrub TOTAL | | 101,817 | 169,390 | | | | | | | | | | | | | | | | |
| AVERAGE | | | | 17.50 | 4.62 | 14.17 | 14.93 | 12.62 | 11.19 | 10 | 11 | 11 | 13 | 12 | 29 | 33 | 32 | 36 | 34 |
| Half Shrub, CP | Hills | 0 | 160 | 5.4 | 3.7 | 5.4 | 5.4 | 4.8 | 4.1 | 14 | 14 | 14 | 16 | 14 | 20 | 20 | 20 | 22 | 20 |
| | Loamy | 101 | 101 | 50.0 | 4.6 | 50.0 | 50.0 | 44.5 | 37.5 | 5 | 5 | 5 | 6 | 6 | 8 | 8 | 8 | 9 | 10 |
| Half Shrub, SO | Loamy | 1,633 | 1,681 | 11.3 | 4.4 | 11.3 | 11.3 | 10.1 | 8.5 | 13 | 13 | 13 | 14 | 16 | 40 | 40 | 40 | 45 | 49 |
| | Sandy | 1,204 | 1,609 | 40.5 | 4.5 | 40.5 | 40.5 | 36.0 | 30.4 | 6 | 6 | 6 | 7 | 7 | 13 | 13 | 13 | 14 | 15 |
| Half Shrub, WP-2 | Loamy | 321 | 616 | 26.7 | 3.0 | 26.7 | 26.7 | 23.8 | 20.0 | 11 | 11 | 11 | 12 | 12 | 34 | 34 | 34 | 37 | 38 |
| Half Shrub, WP-3 | Hills | 71 | 200 | 14.7 | 2.1 | 14.7 | 14.7 | 13.1 | 11.0 | 12 | 12 | 12 | 13 | 13 | 48 | 48 | 48 | 53 | 52 |
| Half Shrub TOTAL | | 3,330 | 4,367 | | | | | | | | | | | | | | | | |
| AVERAGE | | | | 25.07 | 4.11 | 25.07 | 25.07 | 22.31 | 18.82 | 10 | 10 | 10 | 11 | 11 | 28 | 28 | 28 | 31 | 33 |
| GRANO TOTALS | | 858,985 | 1,323,301 | | | | | | | | | | | | | | | | |
| OVERALL AVERAGE /2 | | /3 | /3 | 23.12 | 5.37 | 17.87 | 19.27 | 15.98 | 14.45 | 8 | 11 | 10 | 12 | 11 | 37 | 40 | 39 | 45 | 45 |

/1 Potential represents the ultimate vegetative grazing capacity, density, and cover possible on the range site. Potential was calculated from SCS Range Site Guides. These guides represent large areas and are not always completely applicable to this area. Values shown in this column are sometimes greater than Existing Environment (EE) and/or the Alternatives. We feel that the potential will at least always equal No Grazing (NG).
/2 Density and cover averages were rounded to nearest whole numbers.
/3 Will not equal Chapter 1 acreage figures because of rounding.
/4 Under the No Action Alternative vegetation on the 25 existing AMPs would respond as predicted for the Proposed Action (PA). Vegetation on the 96 non-AMP allotments would be maintained at the Existing Environment (EE) level.

EE - Existing Environment
Potent - Potential
PA - Proposed Action
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Source: Range Survey, Socorro County Soil Survey, Methodologies (Appendix 2, p. A-38), SCS Range Site Guides

ceives some water run-in; and 3) a tall grass represented by giant dropseed on deep sand sites or sacaton on overflow sites.

**Short-Grass Subtype**

Black grama is the characteristic short grass found on good condition sites in the SD MLRA (Figure 2-2). Such sites are found on some sandy range sites within allotments 272 and 293. It is also the dominant species found on north-facing slopes on gravelly range sites within most allotments along the Rio Grande. It has been selected as the key species in these areas. Vigorous black grama stands on sandy range sites within allotments 251, 284, and 301 and other CP-designated allotments illustrate that it can also tolerate cooler, more moist sites. As conditions change from the more xeric and thermic SD MLRA to the more mesic and cooler CP and WP MLRAs, the dominant grass changes from black grama to blue grama. Blue grama is common on allotment 275 where it is a major species on loamy and limestone hills range sites. This relationship is also true in the northwestern portion of the area where blue grama is generally the dominant species in the juniper understory. Thus, blue grama is the key species in these areas.

Galleta occurs on residual soils formed over limestone, sandstone, basalt, volcanic cinders, and on alluvial soils. It seldom occurs on gypsum and deep sand soils.

Tobosa is another short grass prominent on allotment 293 where it occurs on inclusions in the malpais range site. These inclusions are swales characterized by deep, fine textured soils which receive run-in water from adjacent sites. Tobosa also grows in small remnant patches on some bottomland range sites on allotment 275. Tobosa was not found in the CP or WP portion of the area. Some additional common short-grass species are: ring muhly, bush muhly, three-awn, wolftail, pappusgrass, sand dropseed, spike dropseed, mesa dropseed, and purple muhly.

**Mid-Grass Subtype**

The characteristic mid-grass is alkali sacaton (Figure 2-3). It is found in all MLRAs, with the best stands occurring on bottomland range sites. Alkali sacaton is the key species in these areas. Good examples of the sacaton type can be seen on allotments 289 and 301. Alkali sacaton is also common on the deep clay loam of valleys in the Mesa del Oro region. These soils are generally Moriarty clays or La Fonda-Moriarty association. As range condition declines on these mid-grass sites, alkali sacaton tends to be replaced by burrograss, ear muhly, and annual forbs (cocklebur, bitterweed, hog potato, and Russian thistle). This retrogression is evident on allotment 114.

**Tall-Grass Subtype**

In the tall-grass subtype giant dropseed is the characteristic indication of a deep sand site. Representative sites are on allotment 285 in the SD MLRA and allotment 301 in the CP MLRA. Sacaton is a tall grass which indicates a bottomland site. Representative stands can be seen on the Anway fine sandy loam on allotment 275.

An important component of all three grass subtypes is the cool- or warm-season tendencies of the plants. Cool-season plants grow early in the spring and warm-season plants grow in the summer. This diversity is important because together they make a more complete use of their environment. This differentiation of vegetation into units with diverse ecologies favors a more complete utilization of environmental resources.

Cool-season grasses are estimated to make up less than 2 percent of the vegetative composition. Common species are: New Mexico feathergrass, needle and thread, southwestern needlegrass, squirreltail, western wheatgrass, and Indian ricegrass. Sixweeks fescue is a common annual, while sacaton and three-awn often express cool-season tendencies. Southwestern needlegrass occurs on limestone outcrops, western wheatgrass on sandy bottomlands, and Indian ricegrass is restricted to sandy soils. Squirreltail occurs as isolated plants throughout the ES Area in widely varying habitats.

*Barren*

One stretch of the Rio Salado channel and flood plain was typed as barren because very little vegetation grows on this site. Also, few acres were typed as barren on the vertisol soil in allotment 293. Most of this barren type, however, is found on allotment 016. The type covers 922 acres in total. Soils within this type have largely been classified into the Riverwash association and have not been included in range sites.

Runoff from summer storms apparently acts as a scouring agent and makes seedling establishment and survival very difficult. However, small stands of saltcedar have become established in some areas. Small isolated communities of saltgrass, saltbush, sacaton, and cottonwoods were included in this type when it was mapped.

*Broadleaf Trees*

The broadleaf deciduous type occurs in the area as thin ribbons along the major drainages. It covers 14,869 acres (about 1 percent) of the vegetation surveyed. Most of the type is in intermittent drainages cutting through wide valley bottoms (i.e., the Canada Bonita disecting a bottomland range site on allotment 016). The broadleaf

Figure 2-1. Juniper and blue grama characterize the pinyon-juniper type (T. 5 S., R. 6 E., Sec. 26).

Figure 2-2. Black grama characterizes a gravelly range site in the grass type (T. 7 S., R. 4 W., Sec. 24).

tree type was classified into two subtypes, broadleaf tree and bosque.

**Broadleaf Tree Subtype**

The broadleaf tree subtype is an important component of the landscape. It offers biological and recreational values. Most of this subtype is in the WP-3 MLRA. The subtype is well developed where the Arroyo Colorado cuts through the La Fonda-Moriarty and Moriarty clays on allotment 129 and where the Canada Bonita cuts through allotment 016.

This subtype is generally dominated by saltcedar and is interspersed with scattered cottonwood. Cottonwood apparently requires a streamflow or underflow to complete its life cycle. Saltbush is the most common understory shrub along the Rio Salado and actually forms nearly pure stands along some stretches. These stands occur on allotment 016 and along Alamocito Creek. Saltcedar has a competitive advantage over saltbush and cottonwood and appears to be encroaching on many sites. Other species in this subtype which are often present in the rocky-gravelly stream channels are brickellbush and burrobrush. Perennial grasses include: alkali sacaton, vine mesquite, western wheatgrass, and saltgrass.

**Bosque Subtype**

The 'bosque' riparian habitat occurs along the Rio Grande (Figure 2- 4). This acreage once resembled the habitat Carothers and Johnson (1971) and Horton and Campbell (1974) recognize as being important for non-game bird habitat. Thompson (1968) explains that due to unique and favorable habitat, riparian vegetation supports a fauna disproportionate to the limited acreage. Jahn and Trefethen (1972) consider riparian vegetation to be the most valuable wildlife habitat in Arizona. The continuous ribbons of 'bosque' riparian habitat found along the drainages from the United States into Mexico are especially important because they serve as migratory routes for birds (Horton and Campbell, 1974). Most of the native cottonwood and willow which once dominated the 'bosque' has been replaced by the invader, saltcedar.

*Perennial Forbs*

The perennial forb type is located on allotment 114 and covers 107 acres. It is found on Mesa del Oro in the intermittent lake bottoms (Laguna Bonita and Laguna del Oro). These bottoms occur as inclusions in a loamy range site. Blueweed makes up 90 percent of the botanical composition. It is a native, noxious weed that grows in dense colonies 1 to 2 feet high. Although blueweed is relatively unpalatable, associated species (western wheatgrass and squirreltail) have some value as forage for livestock.

*Half-Shrub*

The half-shrub type covers approximately 4,367 acres (less than one percent) of the vegetation surveyed. The ES Area has two half-shrub subtypes. They are the snakeweed subtype and the hairy coldenia subtype.

**Snakeweed Subtype**

Snakeweed is the most common half-shrub type and is found on the sandy and loamy range sites. The common grass species are black grama, galleta, burrograss, and alkali sacaton. Some of the shrub species of the desert shrub type are also associated with the snakeweed subtype.

**Hairy Coldenia Subtype**

Hairy coldenia is found on allotments 264, 289, and 325. It grows on gypsum range sites. Gyp dropseed is the dominant grass. In areas with slightly deeper soils some of the common grasses are fluffgrass, black grama, galleta, and the dropseeds. The major shrubs are hairy coldenia, snakeweed, and Mormon tea.

*Creosote*

Creosote occurs on most allotments in the SD MLRA but only on a few allotments in the CP and WP MLRAs. It is one of the most extensive vegetative types, covering 211,783 acres (approximately 16 percent) of the vegetation surveyed.

The creosote type dominates the gravelly range site in the SD MLRA (Figure 2-5). Creosote is an invader species. For example, on allotment 252 creosote has invaded the sandy range site and on allotment 272 it has invaded a loamy site.

Within this type the dominant shrub species are creosotebush, American tarbush, and snakeweed. Associated shrub species are Mormon tea and mesquite.

Common grasses include fluffgrass, three-awn, the dropseeds, bush muhly, black grama, and galleta. Black grama and galleta are often found on north-facing slopes. Bush muhly, another common grass, is often restricted to the shelter of the shrubs where they are protected from grazing animals.

The creosote type has a high proportion of annuals which contribute to this type's grazing capacity. Some of the common annuals are annual snakeweed, common bahia, buckwheats, spectacle pod, sixweeks grama, sixweeks three-awn, and windmill grass.

Figure 2-3. Alkali sacaton characterizes a bottomland range site in the grass type.

Figure 2-4. The bosque riparian vegetative type occurs along the Rio Grande (T. 10 S., R. 3 W., Sec. 4).

*Winterfat*

Winterfat type is valuable for grazing, although it only covers 2,396 acres (less than one percent) of the vegetation surveyed. Winterfat is found on allotments 077, 114, 263, and 275. It is usually found on loamy, shallow, and malpais range sites. Common shrubs are bigelow sagebrush and snakeweed. Blue grama, black grama, galleta, ring muhly, sand dropseed, and squirreltail are the common grasses.

*Waste*

Approximately 7,988 acres (less than one percent) of the vegetation surveyed is classified as waste. This type is unusable for livestock, although it is valuable for wildlife and other resources. These areas are usually rock outcrops, steep slopes, or mesa tops. Portions of D-Cross Mountain and Ladron Peak are examples of this type.

*Saltbush*

The saltbush type is found on terraces and flood plains along the Rio Salado, Rio Puerco, and Rio Grande drainages (Figure 2-6) and in some of the smaller drainages. The saltbush type dominates approximately 43,947 acres (roughly 3 percent) of the vegetation surveyed. It is usually on loamy range sites; however, in the WP-2 MLRA a large type was mapped on a clayey bottomland.

The major shrub species is four-wing saltbush. Jones saltbush and shadscale are found in small isolated areas. Other shrubs include broom snakeweed, cholla, desert olive, wolfberry, and mesquite. Common grasses are mesa dropseed, sand dropseed, spike dropseed, alkali sacaton, sacaton, galleta, three-awn, and fluffgrass.

*Mountain Shrub*

The mountain shrub type is uncommon in this area and is valuable wildlife habitat. It covers approximately 192 acres of allotment 301 and grows on a limestone hills range site. The dominant shrub, hairy mountain mahogany, can also be found on other allotments. Common grasses of this type are purple muhly, hairy grama, and three-awn.

*Mesquite*

The mesquite type covers approximately 25,359 acres (2 percent) of the vegetation surveyed. It is generally found on sandy range sites in the SD MLRA (Figure 2-7). Mormon tea, snakeweed, four-wing saltbush, and sand sage are the common shrubs. A variety of grasses occurs on this type. Some of the common ones are black grama, fluff-grass, galleta, and the dropseeds.

*Sagebrush*

The sagebrush type covers 71,452 acres (about 5 percent) of the vegetation surveyed. The type is dominated by sand sagebrush, a strong indicator of loose sandy soil. Most of the sagebrush type is in the SD MLRA. It occurs on sandy sites on allotments 272, 285, and 293 (Figure 2-8). It also occurs on allotments 251, 275, 284, and 301 in the CP MLRA. Dropseeds and black grama are the most common grasses. Snakeweed is a common half-shrub, and yucca is a common shrub.

The Soil Conservation Service (SCS) Range Site Guides state that sand sage, saltbush, winterfat, snakeweed, and feather peabush should total 5 percent of the production in a climax community in the SD and CP MLRAs. Because sand sage frequently represents from 20 to 30 percent of the composition on sandy sites (allotment 285), it is believed that sand sage has increased on many sites. This increase is described in York and Dick-Peddie's (1969) report and suggests that range condition has dropped below the excellent and good condition classes.

*Desert Shrub*

The desert shrub type is an extensive, widespread, and variable vegetative type. It covers some 169,390 acres (approximately 13 percent) of the vegetation surveyed. It contains six different subtypes. They are yucca, spicebush, cholla, Mormon tea, broom dalea, and little-leaf sumac. Most of the desert shrub is in the SD MLRA, but large acreages are also in other MLRAs.

**Yucca Subtype**

Yucca is usually found on sandy range sites. On allotment 293 a large, solid, aesthetic tract of soaptree yucca, of approximately 3,200 acres, is being proposed to be managed as a botanical natural area. Black grama, galleta, three-awn, and the dropseeds are the most common grasses. The dominant shrub is yucca, with snakeweed and Mormon tea being other common shrubs.

**Spicebush Subtype**

Spicebush is a unique and uncommon desert shrub type. It is found on allotments 260 and 271. This subtype is found in rocky canyons or on stony slopes in the SD MLRA. Common grasses are black grama, bush muhly, burrograss, blue grama, and galleta. Mariola, snakeweed, and four-wing saltbush are associated shrubs.

**Cholla Subtype**

Cholla is the largest, most common, and most widespread of the desert shrub subtypes. It occurs on numerous allotments in all MLRAs. It is

Figure 2-5. Creosote characterizes a gravelly range site in the SD MLRA (T. 3 S., R. 1 W., Sec. 25).

Figure 2-6. Four-wing saltbush dominates the saltbush type on loamy range sites in the WP-2 and WP-3 MLRAs.

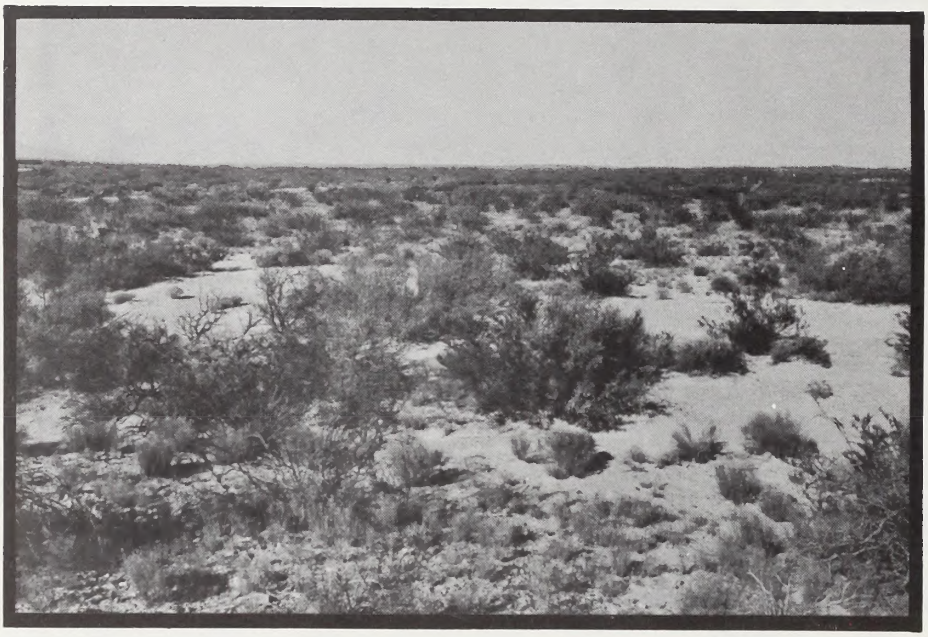


Figure 2-7. Mesquite characterizes the mesquite type on a poor condition sandy range site (T. 4 S., R. 1 E., Sec. 27).

Figure 2-8. Sand sagebrush characterizes the sagebrush type (T. 5 S., R. 4 E., Sec. 14).

found on loamy and sandy range sites (Figure 2-9). Even though this subtype is widespread, it has a uniform vegetative composition. Cholla and snakeweed are the major shrub and half-shrub species, respectively. Of the many grass species found, black grama, blue grama, galleta, burrograss, and the dropseeds are the most common. In the SD MLRA black grama is the dominant grass, whereas blue grama is dominant in the more mesic and cooler CP and WP MLRAs.

### Mormon Tea Subtype

Mormon tea grows on sandy and gypsum range sites. It is especially adapted to the Yesum-Holloman association which is characterized by a sandy surface and gypsum subsurface. Mormon tea often has a stunted appearance in this situation. It is usually associated with snakeweed, sand sage, hairy coldenia, and apache-plume. Black grama, fluffgrass, and the dropseeds are the major grasses.

### Broom Dalea Subtype

Broom dalea is a desert shrub type that occurs on deep sandy soil. It grows together with mesquite, snakeweed, sand sage, and little-leaf sumac. The common grasses are fluffgrass and the dropseeds. Occasionally, Indian ricegrass is found on the broom dalea subtype in the northernmost portion of the ES Area.

### Little-Leaf Sumac Subtype

Little-leaf sumac is found on sandy range sites or on pockets of deep sand included in gravelly, gypsum, or limestone hills range sites. The common grasses are fluffgrass and the dropseeds. Snakeweed and mesquite are the associated shrub species.

## KEY SPECIES

Key species are forage species whose use serves as an indicator to the degree of use of asssociated species. They were identified in the ES Area by AMP writers during development of AMPs. Table 2-3 lists the key species in each vegetative type by range site. The phenology of the key species are summarized in Figure 2-10.

## UNIQUE RIPARIAN AREAS

There are six perennial stream reaches, several perennial springs, and one marsh (800 acres) in the ES Area. Each of the stream reaches is less than two miles long. Typical vegetation along these perennial stream reaches is shown in Figure 2-11.

The Elephant Butte Marsh, even though it is located within the bosque type, supports a flora and fauna which distinguishes it from any other area in New Mexico (Hundertmark, 1973). The unique riparian areas within the ES Area are summarized in Table 2-4.

## THREATENED OR ENDANGERED PLANTS

Spellenberg Consultants (1977), under contract with the BLM Socorro District Office, have explored the possibility of the existence of proposed threatened or endangered (T or E) plant species as listed in the July 1, 1975 and July 16, 1976 issues of the Federal Register. Their exploration has entailed a literature search, herbaria searches, and an on-site survey for T or E plant species. Spellenberg Consultants (1977) found in their literature and herbaria searches that 17 or 18 proposed T or E species (depending on the interpretation of the status of marsh sunflower, *Helianthus praetermissus*) had some potential of occurring in the ES Area. Six of the species were found in the area (Spellenberg Consultants, 1977). Table 2-5 lists the 18 species and summarizes their status.

The New Mexico State Heritage Program (correspondence to BLM Socorro District Office dated July 27, 1977) lists four additional species of plants which they feel should be studied to determine if they merit consideration as T or E plants. They are:

Ladron spiderwort (*Tradescantia ladronensis*)
Amsonia (*Amsonia* sp.)
Pecos bladderpod (*Lesquerella praecos*)
Vernal thelypody (*Thelypodium vernale*)

Ladron spiderwort (*Tradescantia ladronensis*) was described as a new species. Spellenberg, however, has studied the plant and feels it is not a new species. He identifies it as Wright's spiderwort (*Tradescantia wrightii*) (correspondence to BLM Socorro District Office dated October 3, 1977). Spellenberg has also collected and studied Amsonia (*Amsonia* sp.). Its status remains uncertain. He feels it may be a subspecies or variety of *A. hirtella* (correspondence dated 1977). Spellenberg (1976) concluded from his searches that 'no other plant species recorded from this area might be considered to be unique or rare.'

## RANGE CONDITION

Range condition is the present state of vegetation on a range site in relation to the climax (natural potential) plant community for that site (SCS, 1976). Range condition in the ES Area is shown on Map 2-3 and summarized in Table 2-6. The range condition methodology is discussed in Appendix 2, p. A-40. An allotment breakdown is shown in Table A-6 (Appendix 2, p. A-41).

## RANGE TREND

'Range trend is the direction of change in range condition' (Society of Range Management, 1974).

TABLE 2-3

OCCURRENCE OF KEY SPECIES IN TEN VEGETATIVE TYPES*, AND THEIR RELATIONSHIP TO SIXTEEN RANGES

| Range Site | Vegetative Type: Grassland | Sagebrush | Mountain Shrub | Pinyon-Juniper | Broadleaf | Creosote | Mesquite | Saltbush | Winterfat | Desert Shrub |
|---|---|---|---|---|---|---|---|---|---|---|
| Bottomland<br>Total Ac. 49,351 | Sacaton<br>Galleta | | | Sacaton | Saltbush<br>Sacaton | | | Sacaton<br>Saltbush | | Dropseeds<br>Black grama |
| Basalt Hills<br>Total Ac. 37,314 | Blue grama<br>Galleta | | | | | | | | | |
| Hills<br>Total Ac. 88,845 | Blue grama<br>Galleta | | | Black grama<br>Galleta | | Black grama<br>Galleta | | | | Black grama |
| Malpais<br>Total Ac. 71,034 | | | | Blue grama<br>Black grama | | | | | | Black grama<br>Galleta |
| Shallow<br>Total Ac. 50,559 | Blue grama<br>Black grama | | | Blue grama<br>Black grama | | | | | | |
| Loamy<br>Total Ac. 255,042 | Black grama<br>Galleta | Black grama | | Galleta<br>Black grama | Saltbush<br>Sacaton | Black grama<br>Blue grama | | Saltbush<br>Sacaton | | Galleta<br>Black grama |
| Sandy<br>Total Ac. 194,082 | Dropseeds<br>Galleta | Black grama<br>Dropseeds | | Black grama<br>Dropseeds | | Galleta<br>Black grama | Dropseeds<br>Saltbush | Galleta<br>Saltbush | | Dropseeds<br>Black grama |
| Sandstone Hills<br>Total Ac. 4,833 | | | | | | | | | | |
| Shallow Sandy<br>Total Ac. 749 | | | | | | | | | | |
| Shallow Sandstone<br>Total Ac. 18,287 | | | | | | | | | | |
| Deep Sand<br>Total Ac. 37,536 | | Dropseeds<br>Saltbush | | Galleta<br>Saltbush | | | Dropseeds | | | |
| Gravelly<br>Total Ac. 259,974 | Black grama<br>Galleta | | | Black grama<br>Blue grama | | Black grama<br>Galleta | Black grama | | Galleta<br>Winterfat | |
| Gypsum Hills<br>Total Ac. 15,662 | | | | | | | | | | |
| Limestone Hills<br>Total Ac. 131,766 | Blue grama<br>Black grama | | Mountain<br>Mahogany | Black grama<br>Blue grama | | Blue grama<br>Galleta | | | | |
| Igneous Hills<br>Total Ac. 7,710 | | | | | | | | | | |
| Gypsum<br>Total Ac. 47,127 | | | | Black grama<br>Blue grama | | | | | | Dropseeds<br>Black grama |
| No Site<br>Total Ac. 53,430 | | | | | | | | | | |
| 1,323,301** | 260,434 | 71,452 | 192 | 510,095 | 14,869 | 211,783 | 25,359 | 43,947 | 2,396 | 169,390 |

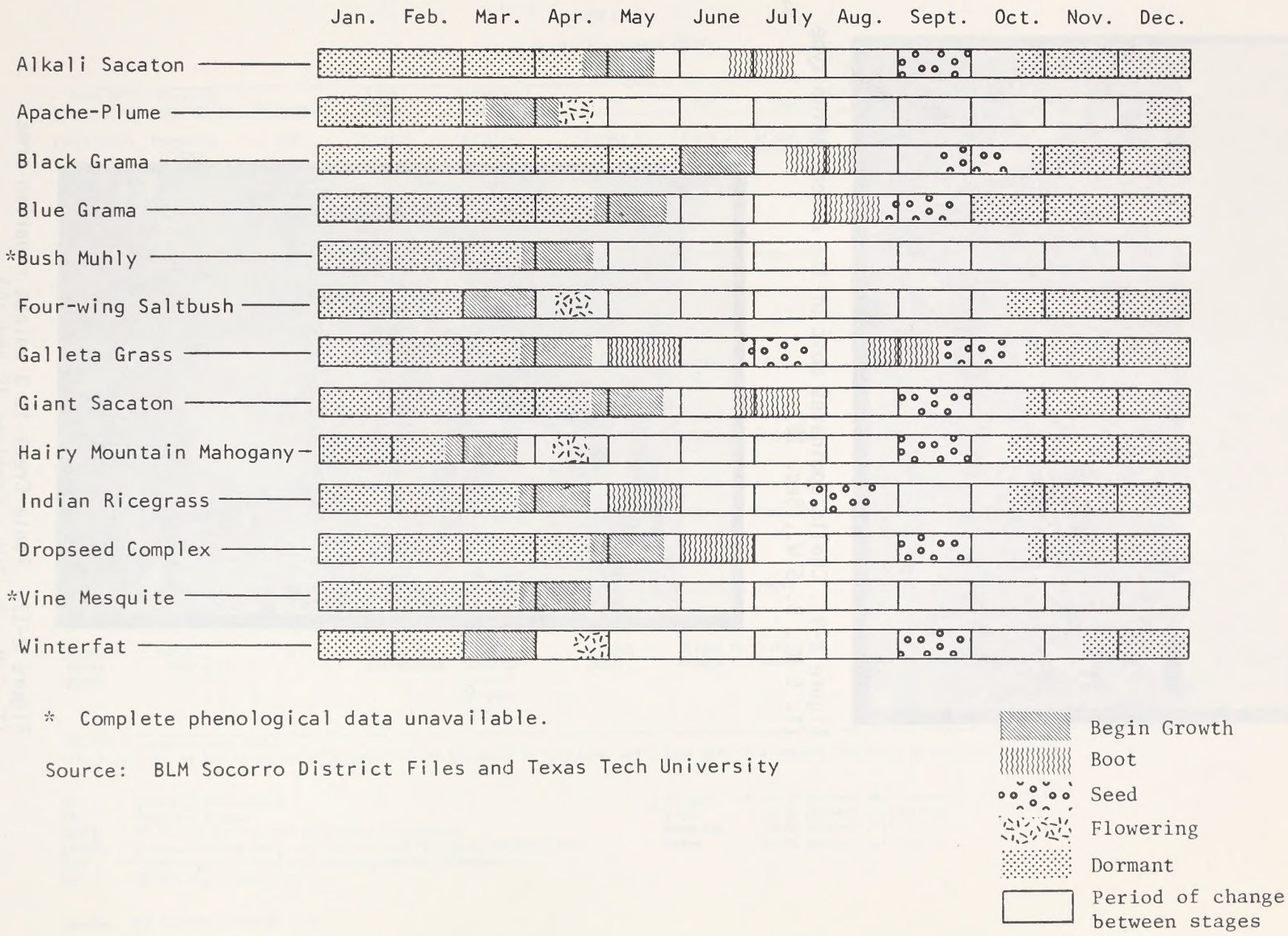
*Key areas were not located in four vegetative types. These types and respective acreages were: Waste, 7,988; Barren, 922; Half-shrub, 4,367, and Perennial forb, 107.

**Will not equal Chapter 1 acreage figures because of rounding.

Source: Proposed AMPs, Socorro County Soil Survey, Socorro District

FIGURE 2-10

PHENOLOGICAL DEVELOPMENT FOR KEY SPECIES




* Complete phenological data unavailable.

Source: BLM Socorro District Files and Texas Tech University

Figure 2-9. Cholla dominates most of the desert shrub type (T. 5 N., R. 5 W., Sec. 18).

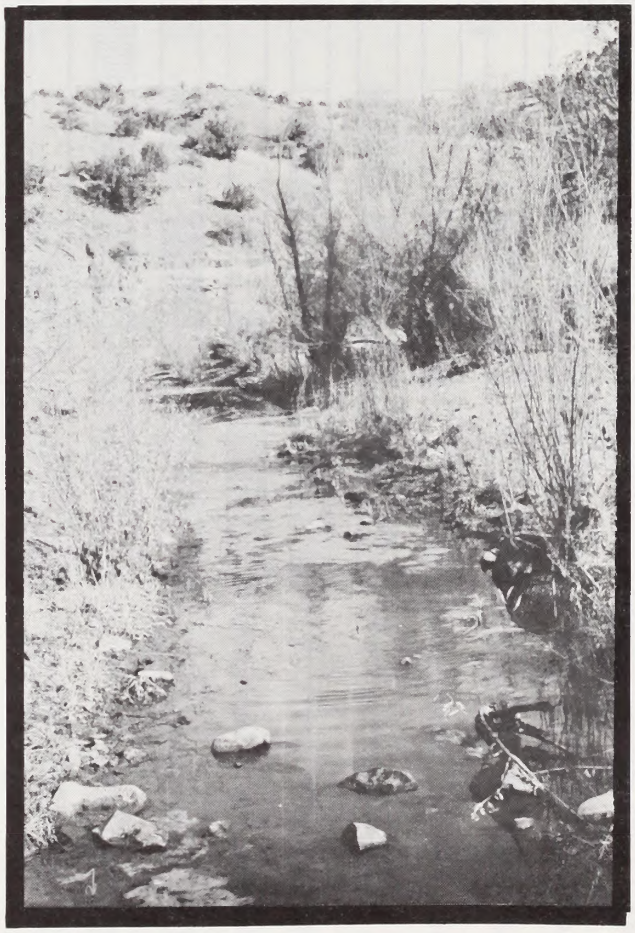


Figure 2-11. Ponia Creek is a unique riparian area (T. 7 N., R. 4 W., Sections 18 and 19).

TABLE 2-4

SEVEN UNIQUE RIPARIAN AREAS*

| Name of Unique Area | Physical Description | Allotment | Land Status | Biological Importance | Livestock Utilization /1 | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | EE | PA | NA/FE | LA/PCL | ESR | NG |
| Ponia Creek | Perennial stream (1 mi.) | 065 | Private | Cattails, willows, flathead minnow, Rio Grand Chub (mountain lion sighting) | Slight to moderate | Slight to moderate | Slight to moderate | Slight to moderate | Slight to moderate | Slight to moderate |
| Mesa Carrizo Streams | Perennial streams (4 mi.) | 002 | Private and Public | Unknown | Moderate | Moderate | Moderate | Moderate | Moderate About 2 mi. would not be grazed | 1) Private land-moderate 2) Public land would be ungrazed. |
| Rio Salado | Perennial springs & seeps | 012,016, 059 | Private and Public | Unknown | Heavy | Moderate | Heavy | Moderate | Moderate and ungrazed** | 1) Private land-heavy 2) Public land would be ungrazed. |
| Arroyo Colorado | Several Artesian (alkaline) | 129 | Private | Unknown | Heavy | Moderate | Moderate | Moderate | No livestock use | Heavy |
| Las Canas Spring | Spring | 287 | Private | Unknown | Heavy | Moderate | Moderate | Moderate | No livestock use | Heavy |
| Ojo Saladito | Perennial stream (1 mi.) | 006 | Private | Unknown | Heavy | Moderate | Heavy | Moderate | Moderate | Heavy |
| Elephant Butte Marsh | Marsh (800 ac.) | 277 | Bureau of Reclamation | Rookery-Cormorant Heron, Mexican Duck | Slight to heavy | Slight to moderate | Slight to heavy | Slight to moderate | No livestock use | No livestock use |

*Water is present year-round.
**That part of the Rio Salado on allotments 016 and 059 would be ungrazed; while that part on allotment 012 would be moderately grazed.

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA/PCL - Livestock Adjustment and Pasture Capacity Level Alternatives
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

/1 Slight = 0-20 percent utilization
Light = 20-40 percent utilization
Moderate = 40-60 percent utilization
Heavy = 60-80 percent utilization

Source: BLM Socorro District Files

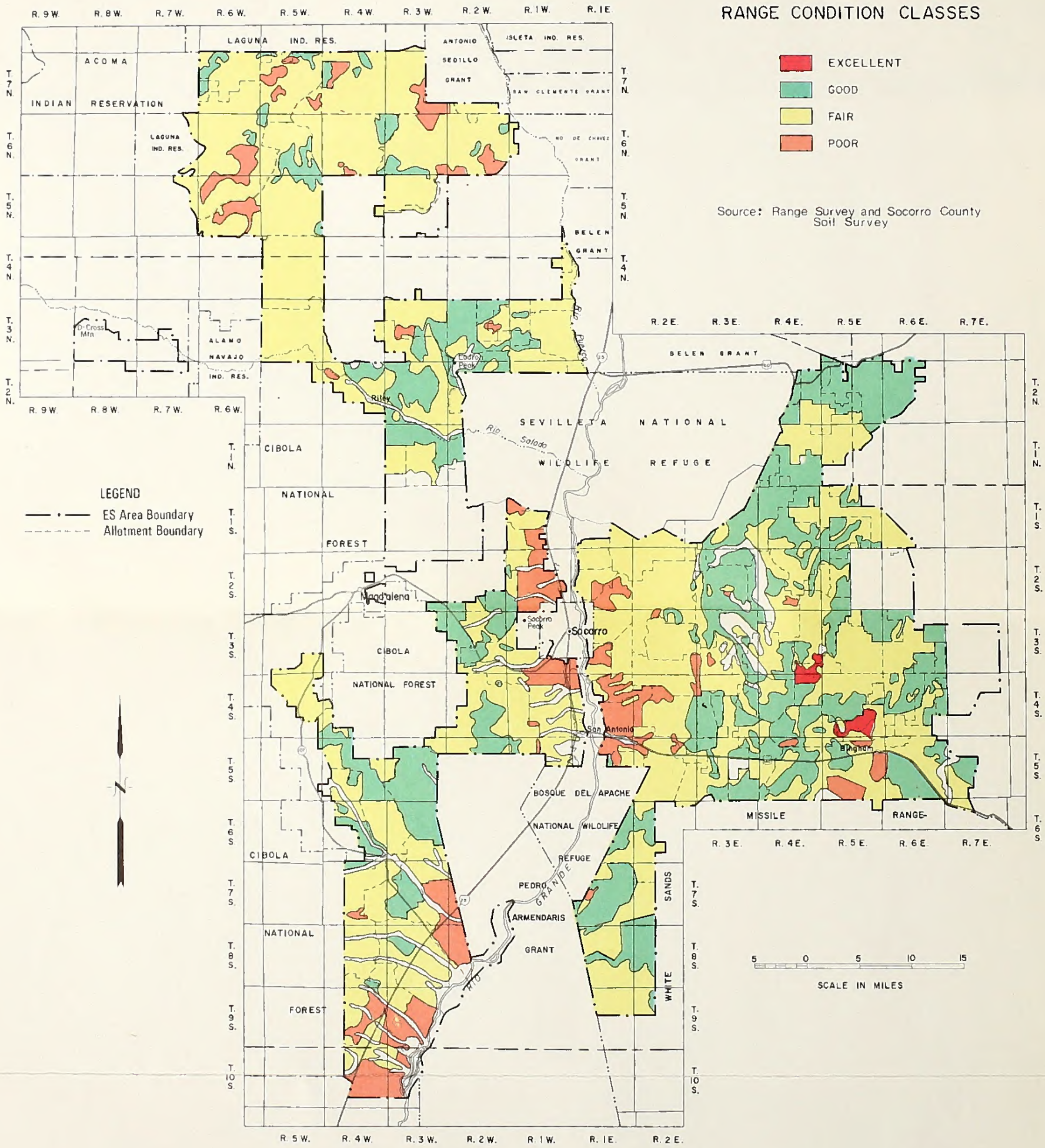
TABLE 2-5

PROPOSED THREATENED OR ENDANGEREO PLANT SPECIES IN ES AREA

| Species | Presence in ES Area | Specific Habitat | Impacts PA NA/FE LA PCL ESR NG |
|---|---|---|---|
| Marsh parsley<br>Aletes filifolius | Verified | Mesic Canyon and Slope | Unknown |
| Pricklepoppy<br>Argemone pleiacantha ssp. pinnatisecta | Possible Occurrence | | Unknown |
| Zuni milkvetch<br>Astragalus accumbens | Possible Occurrence | Sacramento Mountains | Unknown |
| Castetter Milkvetch<br>Astragalus castetteri | Possible Occurrence | Limestone, 5,000-6,000 ft. | Unknown |
| Flintmountain milkvetch<br>Astragalus siliceus | Possible Occurrence | Quartz Outcrop | Unknown |
| Multistem beeplant<br>Cleome multicaulis | Possible Occurrence | Alkaline Areas | Unknown |
| Mogollon Oraba<br>Oraba mogollonica | Possible Occurrence | Mesic Canyon | Unknown |
| Rhizome Fleabane<br>Erigeron rhizomatous | Possible Occurrence | Chinle Clay (McKinley County) | Unknown |
| Cutleaf Sunflower<br>Helianthus laciniatus spp. crenatus | Possible Occurrence | Moist Spots | Unknown |
| Paradox Sunflower<br>H. paradoxus | Possible Occurrence | Marsh | Unknown |
| Marsh Sunflower<br>H. praetermissus | Possible Occurrence | Marsh | Unknown |
| Sealavender<br>Limonium limbatum | Verified | Moist Alkaline Areas | No livestock grazing No effect |
| Grama cactus<br>Pediocactus papyracanthus | Possible Occurrence | Blue Grama Sites | Unknown |
| Rock Oaisy<br>Perityle staurophylla | Possible Occurrence | Limestone Cliffs | Unknown |
| Sandy Prairieclover<br>Petalostemum scariosum | Verified | Sandy Areas | No livestock grazing No effect |
| Desert Rose<br>Rosa stellata | Verified | Mesic Canyon | No livestock grazing No effect |
| Scarlet figwort<br>Scrophularia coccinea | Possible Occurrence | Mesic Canyon | Unknown |
| Plank's silene<br>Silene plankii | Verified | Igneous Cliffs | Inaccessible to livestock |

PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Source: Spellenberg Consultants, 1977




MAP 2-3. Range Condition Classes

TABLE 2-6

SUMMARY OF RANGE CONDITION CLASSES FOR THE LONG TERM

| Range Condition | EE | PA | NA/FE | LA | PCL/ESR | NG |
|---|---|---|---|---|---|---|
| Excellent | | | | | | |
| Public | 3,410 | 20,814 | 7,587 | 17,333 | 31,720 | 31,256 |
| Other | 3,676 | 10,258 | 5,256 | 8,942 | 14,383 | 14,207 |
| Total | 7,086 | 31,072 | 12,843 | 26,275 | 46,103 | 45,463 |
| % Total | 1 | 2 | 1 | 2 | 4 | 4 |
| % Change | - | +338 | +81 | +271 | +551 | +542 |
| Good | | | | | | |
| Public | 232,046 | 251,010 | 236,597 | 247,217 | 262,895 | 262,389 |
| Other | 87,761 | 102,614 | 91,325 | 99,643 | 111,931 | 111,525 |
| Total | 319,807 | 353,624 | 327,922 | 346,860 | 374,816 | 373,914 |
| % Total | 24 | 27 | 25 | 26 | 28 | 28 |
| % Change | - | +11 | +3 | +8 | +17 | +17 |
| Fair | | | | | | |
| Public | 484,904 | 454,637 | 477,640 | 460,691 | 435,670 | 436,478 |
| Other | 285,796 | 267,658 | 281,443 | 271,285 | 256,292 | 256,775 |
| Total | 770,700 | 722,295 | 759,083 | 731,976 | 691,962 | 693,253 |
| % Total | 58 | 55 | 58 | 56 | 53 | 53 |
| % Change | - | -6 | -2 | -5 | -10 | -10 |
| Poor | | | | | | |
| Public | 81,350 | 75,249 | 79,886 | 76,469 | 71,425 | 71,588 |
| Other | 43,956 | 40,659 | 43,165 | 41,319 | 38,593 | 38,681 |
| Total | 125,306 | 115,908 | 123,051 | 117,788 | 110,018 | 110,269 |
| % Total | 10 | 9 | 9 | 9 | 8 | 8 |
| % Change | - | -8 | -2 | -6 | -12 | -12 |
| No Range Condition Class /2 | | | | | | |
| Public | 59,657 | 59,657 | 59,657 | 59,657 | 59,657 | 59,657 |
| Other | 35,591 | 35,591 | 35,591 | 35,591 | 35,591 | 35,591 |
| Total | 95,248 | 95,248 | 95,248 | 95,248 | 95,248 | 95,248 |
| % Total | 7 | 7 | 7 | 7 | 7 | 7 |
| % Change | - | 0 | 0 | 0 | 0 | 0 |
| Public Acres | 861,367 | 861,367 | 861,367 | 861,367 | 861,367 | 861,367 |
| Other Acres | 456,780 | 456,780 | 456,780 | 456,780 | 456,780 | 456,780 |
| GRAND TOTALS /1 | 1,318,147 | 1,318,147 | 1,318,147 | 1,318,147 | 1,318,147 | 1,318,147 |

/1 Does not include 332,067 acres of private and State land in non-AMP areas.
/2 These are areas where SCS has not developed range site guides. This is because these areas are low producing sites such as badlands, steep slopes, and river washes. In addition, a small amount of acreage was included because a soil survey was not completed.

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Source: Tables A-6 and A-18 in Appendix 2

It is 'a separate determination that is necessary for assessing what is currently happening to the plant community' (SCS, 1976). Because management differs on each allotment, trend reflects both current and past management practices; therefore, trend must be analyzed on an allotment-by-allotment basis. Ideally, range trend requires at least two sets of readings, preferably 5 to 10 years apart. As shown on Table A-6 (Appendix 2, p. A-41), 68 percent of the ES Area is presently in poor and fair range condition. This indicates that trend has generally stablized at a less than desirable range condition. Socorro District personnel determined apparent range trend on 23 allotments during 1977. Trend was estimated to be static on 19 allotments, down on 3, and up on 1. Therefore, for the purpose of this analysis, range trend is assumed to be stable (Appendix 2, p. A-44).

## VEGETATIVE POTENTIAL

The Proposed Action and alternatives can be analyzed in greater detail if there is some level in which to compare the existing and predicted vegetative parameters. This is possible by using the SCS Method of identifying range sites and analyzing the existing vegetation and making a comparison to the climax or potential community which the site could produce (Appendix 2, p. A-44). The potential community is the highest ecological development of a plant community capable of perpetuation under the existing climatic and edaphic conditions (SCS, 1976). There is no time frame associated with the potential community. Table A-18 (Appendix 2, p. A-58) summarizes the potential vegetative AUMs by allotment. Potential productivity for each soil in the ES Area is presented in Column P of Table 2-8. The values shown on Table 2-8 were taken from the SCS soils Form 5's for normal years.

### *Future Environment*

On the 25 existing AMP allotments average density would increase from the existing level of 8 to 11 percent, and average cover would increase from 37 to 40 percent. Average density would change from 6 to 13, 8 to 10, 7 to 8, and 10 to 11 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 35, 41 to 44, 56 to 57, and 29 to 33 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Density and cover are not expected to increase on non-AMP allotments, because under this alternative the proposed grazing systems and adjustments would not be implemented.

The percent composition of the key species would increase on the 25 existing AMP allotments. The increase by individual species would range from 2 to 10 percent. On the non-AMP allotments composition is expected to remain unchanged because there would be no livestock adjustment or new grazing systems implemented.

Vegetative production would increase 38 percent on the 25 existing AMP allotments, from 31,972 to 44,018 AUMs. On the non-AMP allotments production would remain at the existing level, 102,925 AUMs. The total change would be a 9-percent increase from 134,942 to 146,988 AUMs. In the short term 90 acres would be disturbed by range developments. In the long term 67 acres would not be available for vegetative production because of range developments. This would occur only on the 25 existing AMP allotments as there would be no range development construction on non-AMP allotments.

### *Impacts*

## DENSITY AND COVER

The combination of livestock adjustments and the effects of the proposed grazing systems on AMP allotments would cause vegetative density and cover to increase in the long term. Grazing systems would allow for systematic deferment of pastures. These periods of non-use would promote plant vigor, increase seed production, and increase seedling establishment. The livestock adjustments would lower the percent of forage utilization. This would allow more plants to complete their life cycle and would encourage increased reproduction. A lower percentage of utilization would allow plants to remain vigorous. The overall average improvements in density and cover are shown in Table 2-2. These increases are based on key and comparison area data (Appendix 2, p. A-47).

Small increases in density result in large increases in production. This can be illustrated by using the data and formula on Figure A-3, p. A-12, and the Existing Environment and the long-term Proposed Action average density values.

Example:

Existing Environment Average Density equals 8 percent.

Average Proper Use Factor (.395) times Existing Environment Average Density (8 percent) equals Forage Acre Factor (.032) times Percent Utilization (100 percent) equals Net Forage Acre Factor (.032); Forage Acre Requirement (.25) divided by Net Forage Acre Factor (.032) equals Acres per AUM (7.8).

Predicted Long-Term Proposed Action Average Density equals 11 percent.

Average Proper Use Factor (.395) times Long-Term Proposed Action Average Density (11 percent) equals Forage Acre Factor (.043) times Percent Utilization (100 percent) equals Net Forage Acre Factor (.043); Forage Acre Requirement (.25) divided by Net Forage Acre Factor (.043) equals Acres per AUM (5.8).

640 Acres divided by Existing Acres per AUM (7.8) equals 82 AUMs.

640 Acres divided by Predicted Long-Term Acres per AUM (5.8) equals 110 AUMs.

Therefore, the increase in production from 82 to 110 AUMs per section is 34 percent.

The predicted increases in density and cover are realistic because they approach the overall average response reported in published research from many parts of the western ranges. These studies, however, demonstrate variability. For example, Gifford and Hawkins (1976) concluded that all grazing systems affect litter and cover similarly. However, Martin (1973) found that grass density increased 36 percent under rotational, rather than yearlong, grazing. Another study (Reardon and Merrill, 1976) reported that there is more litter on pastures grazed in a rotational system than on pastures grazed yearlong. Herbage response, however, is inconsistent in the Southwest. Examples occurred in southern Arizona when perennial grasses did not significantly increase with summer (July through October) non-use during three out of four summers (Martin, 1973); grass density increased significantly on ranges rested 44 to 67 percent of the time (Martin and Ward, 1976); and perennial grasses fared poorly on ranges grazed in winter and best on those grazed yearlong (Martin, 1970). This indicates the difficulty in predicting exactly how density and cover would respond with implementation of grazing systems. Martin's (1973) and Reardon and Merrills' (1976) studies suggest that density and cover would increase when grazing systems are implemented.

The same variation appears in the literature when density and cover data is related to grazing intensity. Hazel (1968) reported that, occasionally, there is no correlation between grazing intensity and cover. However, Paulsen (1954, cited in Pond, 1957) found that grazing intensity eventually affects density and composition. This is apparent in the Intermountain Region. Here cover decreased by 8.4 percent when the vegetation was utilized at a 30-percent level (Stoddart, 1963). When utilization was 90 percent, cover decreased by 34.6 percent (Stoddart, 1963). He also found that a 75-percent forage removal was significantly more harmful than a 50-percent level of forage removal. In contrast, heavy grazing caused plant cover to increase on blue grama ranges in the Northern Plains (Smoliak, Dormaar, and Johnston, 1972). Vegetation in the ES Area should respond more like vegetation in the Intermountain Region than vegetation in the Northern Plains.

Density and cover should increase in the ES Area when grazing systems are implemented and livestock numbers are adjusted. This would be a long-term, area-wide impact.

**Proposed Action** - As the proposed grazing systems are implemented on AMP allotments and utilization decreases from heavy (60 to 80 percent) to moderate (40 to 60 percent), the average total density would increase from the existing level of 8 to 11 percent; and average cover would increase from 37 to 40 percent. Average density in the major vegetative types would change from 6 to 13, 8 to 10, 7 to 8 and 10 to 11 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 35, 41 to 44, 56 to 57, and 29 to 33 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Density and cover are not expected to increase on non-AMP allotments, because public lands are intermingled with other lands and total livestock numbers are not set by BLM.

**No Action Alternative** - As the proposed grazing systems are implemented on the 25 existing AMP allotments and utilization decreases from heavy (60 to 80 percent) to moderate (40 to 60 percent), the average total density would increase from the existing level of 8 to 11 percent, and average total cover would increase from 37 to 40 percent. Average density in the major vegetative types would change from 6 to 13, 8 to 10, 7 to 8, and 10 to 11 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 35, 41 to 44, 56 to 57, and 29 to 33 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Density and cover are not expected to increase on non-AMP allotments, because under this alternative the proposed grazing systems and adjustments would not be implemented. Conditions would remain as they are in the Existing Environment.

**Livestock Adjustment Alternative** - As the proposed grazing systems are implemented on the 25 existing AMP allotments and utilization decreases from heavy (60 to 80 percent) to moderate (40 to 60 percent), the average total density would increase from the existing level of 8 to 10 percent, and average total cover would increase from 37 to 39 percent. Average density would change from 6 to 14, 8 to 10, 7 to 7, and 10 to 11 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 33, 41 to 43, 56 to 57, and 29 to 32 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Density and cover are not expected to increase on non-AMP allotments, because public lands are intermingled with other lands and total livestock numbers are not set by BLM.

**Pasture Capacity Level Alternative** - As the proposed grazing systems are implemented on AMP allotments and utilization decreases from heavy (60 to 80 percent) to light (20 to 40 percent), the average total density would increase from the existing level of 8 to 12 percent, and average total cover would increase from 37 to 45 percent. Average density would change from 6 to 14, 8 to 11, 7 to 9, and 10 to 13 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 39, 41 to 49, 56 to 64, and 29 to 36 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Density and cover are not expected to increase on non-AMP allotments because public lands are intermingled with other lands and total livestock numbers are not set by BLM.

**Enhancement of Sensitive Resource Values Alternative** - As the proposed grazing systems are implemented on AMP allotments and utilization decreases from heavy (60 to 80 percent) to light (20 to 40 percent), the average density would increase from the existing level of 8 to 12 percent, and average cover would increase from 37 to 45 percent. Average density would change from 6 to 14, 8 to 11, 7 to 9, and 10 to 13 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 39, 41 to 49, 56 to 64, and 29 to 36 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Density and cover are not expected to increase on non-AMP allotments, because public lands are intermingled with other lands and total livestock numbers are not set by BLM.

**No Grazing Alternative** - Because there would be no grazing on public lands, average density would increase from the existing level of 8 to 11 percent, and cover would increase from 37 to 45 percent. Average density would change from 6 to 13, 8 to 11, 7 to 9, and 10 to 12 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. Average cover would change from 30 to 37, 41 to 49, 56 to 68, and 29 to 34 percent on grass, pinyon-juniper, creosote, and desert shrub vegetative types, respectively. On the State and private lands density and cover are not expected to change.

## VEGETATIVE COMPOSITION

The combination of livestock adjustments and the effects of the proposed grazing systems on AMP allotments would cause vegetative composition to improve toward a higher successional stage. This improvement is based on key and comparison area data (Appendix 2, p. A-47). This increase would result in higher grazing capacities as desirable forage plants replace less desirable ones (Table 2-7). Small increases in composition result in large increases in grazing capacities. This is shown below where individual key species composition changes of 5 percent result in a 55 percent increase in grazing capacities with all other factors remaining constant.

1. By using proper use factors of 55 for black grama, 50 for mesa dropseed, 5 for fluffgrass, 10 for three-awn, 50 for four-wing saltbush and 1 for broom snakeweed and the following changes in composition: black grama from 5 to 10 percent, mesa dropseed from 10 to 15 percent, fluffgrass from 10 to 5 percent, three-awn from 10 to 5 percent, four-wing saltbush from 5 to 10 percent, and broom snakeweed from 10 to 5 percent, the total average proper use factor for Existing Environment and predicted long term would be .119 to .189, respectively. Figure A-3, (Appendix 2, p. A-12), illustrates how total average proper use factors are calculated.

2. The grazing capacities for both examples are figured using the formula shown at the bottom of Figure A-3, p. A-12.

Existing Environment Average Proper Use Factor equals .119.

Existing Average Proper Use Factor (.119) times Existing Environment Average Density (10 percent) equals Forage Acre Factor (.012) times Percent Utilization (100 percent) equals Net Forage Acre Factor (.012); Forage Acre Requirement (.25) divided by Net Forage Acre Factor (.012) equals Acres per AUM (20.8).

Predicted Long-Term Average Proper Use Factor equals .189.

Predicted Long-Term Average Proper Use Factor (.189) times Average Density (10 percent) equals Forage Acre Factor (.019) times Percent Utilization (100 percent) equals Net Forage Acre Factor (.019); Forage Acre Requirement (.25) divided by Net Forage Acre Factor (.019) equals Acres per AUM (13.2).

3. The increase in AUMs is shown as follows:

640 Acres divided by Existing Acres per AUM (20.8) equals 31 AUMs.

640 Acres divided by Predicted Acres per AUM (13.2) equals 48 AUMs.

Therefore, the increase in grazing capacity from 31 AUMs to 48 AUMs per section is 55 percent. Vegetative composition is not expected to improve on non-AMP allotments, because the public lands are unfenced and intermingled with other lands and livestock numbers are not controlled by BLM.

The predicted improvement in composition is realistic because it is similar to the improvement reported in published research from many parts of the western ranges. However, these studies demonstrate the variability associated with composition data. For example, Reardon and Merrill (1976) found that in Texas decreaser plants increased significantly when pastures were grazed in rotation rather than yearlong. In Colorado, Hanson, Love, and Morris (1931) found that desir-

TABLE 2-7

THE PROPOSED ACTION WOULD CAUSE THE KEY SPECIES TO INCREASE*

| Range Site | Species (Predicted Increases in Percent Composition) |
|---|---|
| Bottomland | Sacaton 4, Galleta 5, Black grama 5, Dropseeds 5 |
| Hills | Blue grama 2, Galleta 1, Black grama 5 |
| Shallow | Blue grama 3, Black grama 8 |
| Loamy | Black grama 3, Galleta 3, Saltbush 2, Sacaton 7 |
| Sandy | Dropseeds 6, Black grama 4 |
| Deep Sand | Dropseeds 2, Galleta 10 |
| Gravelly | Black grama 3, Galleta 2 |
| Limestone Hills | Blue grama 4, Black grama 6, Galleta 5 |
| Gypsum | Black grama 5, Blue grama 3, Dropseeds 5 |

* These predictions are based on key and comparison area data. AMP writers predicted no changes on the remaining range sites.

Source: Proposed and Existing AMPs, Socorro District

able plants increased by 18 percent when pastures were rotationally grazed. Many authors (Hubbard, 1951; Anderson, 1967; Hormay, 1956; Woolfolk, 1960; Martin, 1966; and Dillon, 1958), some of which are in Shiflet and Heady (1971), stated improvement in range condition occurred with rest rotation; but because of differences in site productivity and complexities within grazing systems, there were other results. In Shiflet and Heady's (1971) literature review, Biswell (1951) had a decrease in range condition under rotational grazing. A review of 39 studies of vegetative responses under different grazing systems compared to continuous grazing showed: 31 had improved vegetation, 5 had no significant change, and 3 had a decrease in range condition (Driscoll, 1967). Herbel, Steger, and Gould (1974) suspected that yearlong grazing was detrimental because they reported that black grama (a warm-season species) was best grazed during winter and droughty spring. This would allow it to increase because of the non-use during the summer growing season. Though it is difficult to predict the exact composition changes when grazing systems are implemented in the ES Area, most research does suggest increases in the composition of key species.

The same relationship is observed in the literature when composition is related to grazing intensity. Although most literature suggests that heavy use decreases the desirable component of the vegetative community, some does not. This is especially true after the potential community has been interrupted and partially replaced by a lower successional stage. For example, Jerry Dodd (per. comm., 1977) stated that blue grama range on the Pawnee grasslands did not change in composition regardless of grazing intensities. Vegetative composition in the Northern Great Plains is also relatively stable under heavy grazing (Black, Baker, Clark, and Mathews, 1937; cited in Peterson, 1962). However, Heady (1975) cited a study describing increases of all preferred plants as grazing pressures lightened. Overuse resulted in loss of vigor; then, ultimately, in the disappearance of the desirable plants (Heady, 1975). Smoliak, Dormaar, and Johnston (1972) found that shallow-rooted species replaced the deeper-rooted species with heavy use. Vegetation in the ES Area should respond to the reduced level of livestock grazing much like vegetation responded in the published literature. Overall vegetative composition should improve when grazing systems are implemented and livestock numbers are adjusted. This improvement would occur in AMP areas and is based on key and comparison area data. It would be a long-term, area-wide impact. It would be unmeasurable in the short term.

**Proposed Action** - The predicted increases in percent composition for key species range from 2 to 10 and are summarized by range site in Table 2-7. This results from the implementation of the proposed grazing systems and livestock adjustments.

**No Action Alternative** - The percent composition of the key species would increase on the 25 existing AMP allotments. The increase by individual species would range from 2 to 10 percent. On the non-AMP allotments composition is expected to remain unchanged, because there would be no livestock adjustments or new grazing systems implemented.

**Livestock Adjustment Alternative** - Although there is an expected change in composition, lack of data prevents the quantification of this impact.

**Pasture Capacity Level Alternative** - Although there is an expected change in composition, lack of data prevents the quantification of this impact.

**Enhancement of Sensitive Resource Values** - Although there is an expected change in composition, lack of data prevents the quantification of this impact.

**No Grazing Alternative** - Although there is an expected change in composition, lack of data prevents the quantification of this impact.

## VEGETATIVE PRODUCTION

Plant responses to proper stocking rates and the proposed grazing systems would cause total vegetative production to increase. The most important plant responses that would cause an increase in production are improved plant vigor, increased vegetative density, and a change in plant composition or an increase in key forage species.

Plant vigor is the relative well-being and health of a plant as reflected by its ability to manufacture sufficient food for growth and maintenance. Grazing any time during the growing period of plants reduces the amount of food made and stored by the plants. This reduction, in turn, decreases the plants' capacity to produce both shoot and root growth the following season (Hormay, 1970). In the ES Area continuous yearlong use decreases the plants' ability to make and store food and, therefore, reduce plant vigor. Vigor or health determines a plants' size or robustness. As plants are periodically rested and allowed to produce and store more food, they become healthier. These larger, healthier plants lead to an increase in height and total forage production of individual plants even when density and composition are not affected.

The number of individual plants per unit of area or plant density affects the quantity or total vegetative production of any given area. As plants become healthier and more vigorous, they pro-

duce more seed or are more likely and able to reproduce vegetatively. As a result, more plants would become established per unit area in the ES Area. This increased plant density results in increased production due to more plants being present per unit area.

Plant composition is the percentage each species occupies in the plant community. The proposed grazing systems are designed to meet the physiological needs of the more desirable forage or key species. An increase in composition of key forage species will result in the ES Area as vigor improves (as previously discussed). This, in turn, results in increased density (or more plants per unit area) of the key species.

Proper stocking and the non-use periods in the proposed grazing systems on AMP areas would improve plant vigor, increase the number of established plants, increase accumulated litter (vegetative density), and increase the percentage composition of key species. These individual plant responses would cause total vegetative production to increase (Table 2-2). The projected increase is based on key and comparison area data (Appendix 2, p. A-47). Overall improvement in grazing capacity is indicated when the average acreage required to support an AUM decreases (Table 2-2). The largest increases would occur on loamy and gravelly range sites. Production is not expected to increase on non-AMP areas because the public lands are unfenced and intermingled with non-public lands, and total livestock numbers are not controlled by BLM.

The predicted increases in herbage production for the Proposed Action and alternatives are realistic because they are similar to the overall average increases reported in published research from many parts of the western ranges. However, these studies demonstrate the variability associated with production data and grazing systems. For example, Black and Clark (1942) found that production on the Great Plains did not increase when grazing systems were implemented. But Martin (1973) found that perennial grass production on the Santa Rita Experimental Station was three and one-half times greater under rotational grazing than yearlong grazing. Indications of higher forage production were reported by Hormay (1955), Woolfolk (1960), Martin (1966), Johnson (1965), and many other authors. Therefore, it is difficult to predict exactly how much production would increase when grazing systems are implemented in the ES Area. The cited research, however, does suggest that production would increase with implementation of grazing systems.

The same variation appears in the literature when production data is related to grazing intensity. For example, forb production in Oklahoma increased in heavily grazed pastures (Hazell, 1968). Cook and Stoddart (1963) also found that grazing stimulates twig production on certain shrubs. Although production of shrubs can remain high under heavy use for a few years, vigor and production eventually decrease (Garrison, 1953). Most research has shown that heavy grazing is detrimental to vegetative production (Martin, 1970; Reardon and Merrill, 1976; Schmutz, 1973; Klipple and Costello, 1960; Heady, 1975; and Paulsen and Ares, 1961). Klipple and Bement (1961) cited a study on the west-central South Dakota midgrass ranges where heavy grazing reduced production over 400 pounds per acre, moderate grazing maintained yields, and light grazing increased production by more than 500 pounds per acre. Pond (1957) cited research in Colorado, on the Manitou Experimental Forest, where Arizona fescue production was 40-percent higher on lightly and moderately grazed range than on heavily grazed range. Stoddart et al (1975) also discussed a study in southern Idaho where heavily grazed pastures produced 83 percent of the average yearly production while moderately grazed pastures produced 114 percent. The majority of research generally states that production is lower under heavy grazing and higher under moderate grazing. Therefore, production should increase when grazing systems are implemented and livestock numbers are adjusted. This would be a long-term, area-wide impact. It would not be measurable in the short term. Table 2-2 shows the long-term vegetative response by range site and Table A-18 (Appendix 2, p. A-58) shows vegetative AUMs, in the long term, by allotment.

When range developments are constructed, vegetation on some acreage is removed or disturbed. This would lower total vegetative production. These short-term impacts would recover through natural succession. The area occupied by range developments would not be available for vegetative production. This would be a long-term impact. Both long- and short-term impacts would be site specific although construction is proposed areawide. Table A-2 (Appendix 1, p. A-18) shows the acreage disturbed by allotment while Table 1-4 summarizes the acreage not available for vegetative production in both the short and long terms. Range developments would improve livestock distribution and result in a more uniform utilization of forage. The total AUMs lost because of new range developments would be insignificant in the ES Area. The increased grazing capacity that results from a more uniform use of forage cannot be quantified or separated from the total vegetative response.

**Proposed Action** - As plant vigor improves and plants become larger and healthier, average vege-

tative density increases from 8 to 11 percent, and composition of key species increases, vegetative production would increase 38 percent on AMP allotments from 129,119 to 178,608 AUMs. On non-AMP allotments production would remain at the existing level, 5,778 AUMs. The total change would be a 37-percent increase from 134,942 to 184,488 AUMs. This would lower the average acres per AUM from 23.1 to 17.9. In the short term 580 acres would be disturbed by construction of range developments. In the long term 339 acres would not be available for vegetative production as the area would be occupied by range developments. There would not be any range development construction on non-AMP allotments.

**No Action Alternative** - As plant vigor improves and plants become larger and healthier, average vegetative density increases from 8 to 11 percent, and composition of key species increases, vegetative production would increase 38 percent on the 25 existing AMP allotments from 31,972 to 44,018 AUMs. On the remaining 96 non-AMP allotments production would remain at the existing level of 102,925 AUMs. The total change would be a 9-percent increase from 134,942 to 146,988 AUMs. In the short term 90 acres would be disturbed by range developments. In the long term 67 acres would not be available for vegetative production because of range developments. This disturbance would occur only on the 25 existing AMP allotments as there would be no range development construction on non-AMP allotments.

**Livestock Adjustment Alternative** - As plant vigor improves and plants become larger and healthier, average vegetative density increases from 8 to 10 percent, and composition of key species increases, vegetative production on AMP allotments would increase 31 percent from 129,119 to 168,931 AUMs. On non-AMP allotments total production would be the same as under the Existing Environment and Proposed Action, 5,778 AUMs. The total change would be a 30-percent increase from 134,942 to 174,811 AUMs. This would lower the average acres per AUM from 23.1 to 19.3. In the short term 90 acres would be disturbed by range developments. In the long term 67 acres would not be available for vegetative production because of range developments. This disturbance would occur only on the 25 existing AMP allotments as there would be no range development construction on non-AMP allotments.

**Pasture Capacity Level Alternative** - As plant vigor improves and plants become larger and healthier, average vegetative density increases from 8 to 12 percent, and composition of key species increases, vegetative production would increase 63 percent on AMP allotments from 129,119 to 210,712 AUMs. On non-AMP allotments production would remain at the existing level of 5,778 AUMs. The total change would be a 61-percent increase from 134,942 to 216,592 AUMs. The average acres per AUM would decrease from 23.1 to 16.0. In the short term 580 acres would be disturbed by range developments. In the long term 339 acres would not be available for vegetative production because of range developments. There would be no range development construction on non-AMP allotments.

**Enhancement of Sensitive Resource Values Alternative** - As plant vigor improves and plants become larger and healthier, average vegetative density increases from 8 to 12 percent and composition of key species increases, vegetative production would increase 67 percent, on AMP allotments from 129,119 to 216,118 AUMs. On non-AMP allotments production would increase less than one percent from 5,778 to 5,802 AUMs. The total change would be a 64-percent increase from 134,942 to 221,920 AUMs. The average acres per AUM would decrease from 23.1 to 16.0. In the short term 607 acres would be disturbed by range developments. In the long term 344 acres would not be available for vegetative production because of range developments. There would be no range development construction on non-AMPs.

**No Grazing Alternative** - Because there would be no grazing on public lands, vegetative production on AMP allotments would increase 59 percent from 129,119 to 205,411 AUMs. On non-AMP allotments production would increase from 5,778 to 10,823 AUMs. The total change would be a 60-percent increase from 134,942 to 216,336 AUMs. The average acres per AUM would decrease from 23.1 to 14.5. This increase would take place entirely on the public lands; production on State and private lands is not expected to change. In the short term 1,475 acres would be disturbed by range developments. In the long term 295 acres would not be available for vegetative production because of range developments.

## UNIQUE RIPARIAN AREAS

Livestock adjustments and grazing systems would improve production, density, cover, composition, and condition in the seven unique riparian areas. Improvements in production, density, cover, composition, and range condition cannot be quantified. Table 2-4 shows utilization expected for the Proposed Action and each alternative.

**Proposed Action** - Utilization would decrease from heavy to moderate on five areas and would remain at the present moderate level on Ponia Creek and Mesa Carrizo stream (Table 2-4). This would cause an unquantifiable improvement in

production, density, cover, composition, and range condition.

**No Action Alternative** - Utilization would decrease from heavy to moderate on Ponia Creek, Arroyo Colorado Springs, and Las Canas Spring; these areas are within the 25 existing AMP allotments that would continue to be intensively managed (Table 2-4). The improvement would be unquantifiable. Because there would be no change on the non-AMP allotments, vegetative conditions of the other unique areas would not change.

**Livestock Adjustment Alternative** - Utilization would decrease from heavy to moderate on five areas and would remain at the present moderate level on Ponia Creek and Mesa Carrizo stream (Table 2-4). This would cause an unquantifiable improvement in production, density, cover, composition, and range condition.

**Pasture Capacity Level Alternative** - Utilization would decrease from heavy to moderate on five areas and would remain at the present moderate level on Ponia Creek and Mesa Carrizo stream (Table 2-4). This would cause an unquantifiable improvement in production, density, cover, composition, and range condition.

**Enhancement of Sensitive Resource Values Alternative** - On Ponia Creek utilization would continue to be moderate. On Ojo Saladito utilization would decrease from heavy to moderate. About one-half (2 miles) of the Mesa Carrizo streams and all of the Rio Salado except that portion on allotment 121 would be ungrazed. Utilization would decrease from heavy to moderate on the remaining part of Mesa Carrizo streams and that part of the Rio Salado occurring on allotment 121. Las Canas Spring and Elephant Butte Marsh would not be grazed under this alternative (Table 2-4). This would cause an unquantifiable improvement in production, density, cover, composition, and range condition.

**No Grazing Alternative** - Four areas, Ponia Creek, Arroyo Colorado Springs, Las Canas Spring, and Ojo Saladito, are totally on private land and would continue to be grazed as they presently are. There would be no improvement in vegetative conditions on these areas. Two areas, Mesa Carrizo Streams and Rio Salado, are located on both private and public lands. The portion of these areas on public land would be ungrazed. Use on the remainder would not change as grazing would continue at the present level. Elephant Butte Marsh would not be grazed under this alternative (Table 2-4).

## THREATENED OR ENDANGERED PLANTS

Grazing systems and livestock reductions should not affect the plants that have been included in the proposed list of T or E plant species (Table 2-5). This belief is supported by Spellenberg's (1976) study which found some plants were inaccessible to livestock and others appeared to be undesirable for livestock use. The BLM Socorro District Office contacted the Fish and Wildlife Service (FWS) for their comments relating to T or E plants. They replied that a proposed list of T or E plants has been developed; but at this time, it has no legal status under the Endangered Species Act.

Construction would not be started until a survey for T or E plants is made. No construction would occur that would disturb or destroy any T or E plants.

**Proposed Action** - No impacts to T or E plants should occur.

**No Action Alternative** - No impacts to T or E plants should occur.

**Livestock Adjustment Alternative** - No impacts to T or E plants should occur.

**Pasture Capacity Level Alternative** - No impacts to T or E plants should occur.

**Enhancement of Sensitive Resource Values Alternative** - No impacts to T or E plants should occur.

**No Grazing Alternative** - No impacts to T or E plants should occur.

## RANGE CONDITION

The existing range condition data and the vegetal increases predicted by the AMP writers were used as the basis for predicting future range condition. It was assumed that a change in vegetal AUMs reflects a change in range condition (Appendix 2, p. A-44). Table 2-6 shows predicted long-term range condition classes for the Proposed Action and each alternative.

**Proposed Action** - A total of 31,072 acres (2 percent) of the ES Area would be in excellent range condition class; this would be a 338-percent increase. A total of 353,624 acres (27 percent) would be in the good condition class, an 11-percent increase. A total of 722,295 acres (55 percent) would be in the fair condition class, a 6-percent reduction. A total of 115,908 acres (9 percent) would be in the poor condition class, an 8-percent reduction. A total of 95,248 acres (7 percent) would remain in the no condition class.

**No Action Alternative** - Range condition would improve on the 25 existing AMP allotments; on the 96 non-AMP allotments range condition would not change from the present. A total of 12,843 acres (1 percent) of the ES Area would be in excellent range condition class; this would be an 81-percent increase. A total of 327,922 acres (25 percent) would be in the good condition class, a 3-percent increase. A total of 759,083 acres (58 percent) would be in the fair condition class, a 2-

percent reduction. A total of 123,051 acres (9 percent) would be in the poor condition class, a 2-percent reduction. A total of 95,248 acres (7 percent) would remain in the no condition class.

**Livestock Adjustment Alternative** - A total of 26,275 acres (2 percent) of the ES Area would be in excellent range condition class; this would be a 271-percent increase. A total of 346,860 acres (26 percent) would be in the good condition class; this would be an 8-percent increase. A total of 731,976 acres (56 percent) would be in the fair condition class; this would be a 5-percent reduction. A total of 117,788 acres (9 percent) would be in the poor condition class; this would be a 6-percent reduction. A total of 95,248 acres (7 percent) would remain in the no condition class.

**Pasture Capacity Level Alternative** - A total of 46,103 acres (4 percent) of the ES Area would be in excellent range condition class; this would be a 551-percent increase. A total of 374,816 acres (28 percent) would be in the good condition class; this would be a 17-percent increase. A total of 691,962 acres (53 percent) would be in the fair condition class; this would be a 10-percent reduction. A total of 110,018 acres (8 percent) would be in the poor condition class; this would be a 12-percent reduction. A total of 95,248 acres (7 percent) would remain in the no condition class.

**Enhancement of Sensitive Resource Values Alternative** - A total of 46,103 acres (4 percent) of the ES Area would be in excellent range condition class; this would be a 551-percent increase. A total of 374,816 acres (28 percent) would be in the good condition class; this would be a 17-percent increase. A total of 691,962 acres (53 percent) would be in the fair condition class; this would be a 10-percent reduction. A total of 110,018 acres (8 percent) would be in the poor condition class; this would be a 12-percent reduction. A total of 95,248 acres (7 percent) would remain in the no condition class.

**No Grazing Alternative** - A total of 45,463 acres (4 percent) of the ES Area would be in excellent range condition class; this would be a 542-percent increase. A total of 373,914 acres (28 percent) would be in the good condition class; this would be a 17-percent increase. A total of 693,253 acres (53 percent) would be in the fair condition class; this would be a 10-percent reduction. A total of 110,269 acres (8 percent) would be in the poor condition class; this would be a 12-percent reduction. A total of 95,248 acres (7 percent) would remain in the no condition class.

## CUMULATIVE IMPACTS

**Proposed Action** - The average total vegetative density would increase from the existing level of 8 to 11 percent (37.5-percent change), and average total cover would increase from 37 to 40 percent (8.1-percent change). Total vegetative production would increase 37 percent from the range survey level of 134,942 to 184,488 AUMs. Excellent and good range condition would increase 4 percent from the existing level of 25 percent. This would be a long-term, area-wide impact.

**No Action Alternative** - On the 25 existing AMPs the average total vegetative density would increase from the existing level of 8 to 11 percent (37.5-percent change), and average total cover would increase from 37 to 40 percent (8.1-percent change). Density and cover are not expected to change from the existing level on the remaining 96 non-AMP allotments. Total vegetative production would increase 9 percent from the range survey level of 134,942 to 146,988 AUMs. Excellent and good range condition would increase 1 percent from the existing level of 25 percent. This would be a long-term, area-wide impact.

**Livestock Adjustment Alternative** - The average total vegetative density would increase from the existing level of 8 to 10 percent (25- percent change), and average total cover would increase from 37 to 39 percent (5.4-percent change). Total vegetative production would increase 30 percent from the range survey level of 134,942 to 174,811 AUMs. Excellent and good range condition would increase 3 percent from the existing level of 25 percent. This would be a long-term, area-wide impact.

**Pasture Capacity Level Alternative** - The average total vegetative density would increase from the existing level of 8 to 12 percent (50-percent change), and average total cover would increase from 37 to 45 percent (21.6-percent change). Total vegetative production would increase 61 percent from the range survey level of 134,942 to 216,592 AUMs. Excellent and good range condition would increase 7 percent from the existing level of 25 percent. This would be a long-term, area-wide impact.

**Enhancement of Sensitive Resource Values Alternative** - The average vegetative density would increase from the existing level of 8 to 12 percent (50-percent change), and average cover would increase from 37 to 45 percent (21.6-percent change). Total vegetative production would increase 64 percent from the range survey level of 134,942 to 221,920 AUMs. Excellent and good range condition would increase 7 percent from the existing level of 25 percent. This would be a long-term, area-wide impact.

**No Grazing Alternative** - The average vegetative density would increase from the existing level of 8 to 11 percent (37.5-percent change), and average cover would increase from 37 to 45 per-

cent (21.6- percent change). Total vegetative production would increase 60 percent from the range survey level of 134,942 to 216,336 AUMs. Excellent and good range condition would increase 7 percent from the existing level of 25 percent. This would be a long-term, area-wide impact.

### *Unavoidable Adverse Impacts*

Vegetative production would be lost on acreage actually occupied by the range developments. This would affect less than 339 acres in the ES Area in the long term (Table 1-4).

## SOILS

### *Existing Environment*

A third order soil survey was completed in the ES Area during l976- 78. Table 2-8 shows mapping units and their component series along with some physical parameters for each of the series listed. Soils are grouped in the table on the basis of range sites and MLRAs (Visual C). The MLRAs are defined in the Vegetation Section of this chapter. Column P of Table 2-8 displays the potential productivity for each soil in pounds per acre dry weight.

The principal factors which determine a soil's susceptibility to wind and water erosion are physical soil properties, degree of slope, and amount of ground cover. Wind and water erosion are discussed separately.

### WATER EROSION

Several factors (slope, permeability, restrictive layers, coarse fragments, soil texture, and vegetative cover) determine how susceptible a soil is to water erosion. Table 2-8 presents physical properties of soils in the ES Area, some of which influence erosion susceptibility. Table A-19 (Appendix 3, p. A-60) presents soils by range site groupings for each allotment.

Soil texture influences erosion susceptibility in several ways. Clay and organic matter act as binding agents which hold soil separates together to form aggregates. Soil aggregates are less susceptible to erosion. Soil texture also influences permeability. Sandy soils are generally more permeable than clayey soils and thus less susceptible to runoff losses.

Soil texture (surface and subsurface) would determine whether or not the soil surface would seal when impacted by falling raindrops. Soils with clayey surface horizons tend to seal shortly after precipitation starts, often causing high rates of runoff; while coarser soils would usually not seal. Soil textures are displayed in columns D and E of Table 2-8. Soils with medium to fine textures have higher sediment yields than the coarse textured soils. Soils in the bottomland, loamy, malpais, and shallow range sites have medium to fine textures and have sediment yields in the moderate and critical classes (Table 2-9). Coarse-textured soils, such as those in deep sand, sandy, and shallow sandy range sites, have the lowest sediment yields (most are in the slight sediment yield class).

The slope of a soil has a direct effect on erosion in that steep slopes are often unstable and are subject to high velocities of surface runoff. Slope ranges are displayed in Column I of Table 2-8.

Coarse fragments impede water erosion in two ways. On the soil surface they act as an armor which protects the soil from raindrop impact and runoff. They also increase soil permeability which decreases runoff. Soils in the gravelly range sites have the highest percentage of coarse fragments. Column J of Table 2-8 presents the percent coarse fragments for all the soils in the ES Area.

Restrictive layers are listed in Column N of Table 2-8. They include coarse fragments throughout the soil profile, gypsum, bedrock, calcic, and petrocalcic horizons. Petrocalcic horizons and bedrock prevent or retard the growth of roots and impede water penetration. High amounts of gypsum and calcium carbonate throughout the soil inhibit plant growth thus increasing the soil's susceptibility to erosion.

Vegetative cover, much like coarse fragments, protects the soil surface from raindrop impact and runoff. Roots help hold the soil in place. Plants add organic matter to the soil which binds the soil into aggregates thus improving soil structure.

Salinity (greater than 4 mmhos) is not considered a significant problem in the ES Area; only mapping unit 476, gypsiorthids (344 acres), indicates a possibility of high salinity values. A column in Table 2-8 was, therefore, not developed to identify salinity values.

The soil sediment yield class is a direct estimate of the erosion rate for a specific soil. Sediment yield classes presented in Table 2-9 and Map 2-4 are based on the Pacific Southwestern Inter-Agency Committee's (PSIAC) Method (1968) for estimating erosion. Sediment yield classes delineated are severe (greater then 3.0 acre-feet per square mile per year), critical (1.0 to 3.0 acre-feet per square mile per year), moderate (0.5 to 1.0 acre-feet per square mile per year), slight (0.2 to 0.5 acre-feet per square mile per year), and stable (less than 0.2 acre-feet per square mile per year). For a discussion of PSIAC Methodology see Appendix 3, p. A-73.

Present annual sediment yield is estimated to be about 1,410 to 1,555 acre-feet. Sediment yields are presented by range site in Table 2-9. Soils in the malpais-SD, sandy-SD, shallow sandy-

TABLE 2-8

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | B | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| **Basalt Hills** | | | | | | | |
| 484 Basalt Rock Outcrop | Rock Outcrop | 45 | | | | | |
| Orthents WP-2 | Orthents | 30 | | | | ST,VST,EXSTL & ST,VST,EXSTS (Variable) | |
| | | | 2,497 | 2,905 | 5,402 | | |
| 406 Cabezon-Apache-Rock Outcrop WP-3 | Cabezon | 35 | | | | 0-3" STL | 3-11" STCL |
| | Apache | 30 | | | | 0-4" STL | 4-16" STL |
| | Rock Outcrop | 25 | | | | | |
| | | | 3,513 | 1,707 | 5,220 | | |
| **Bottomland** | | | | | | | |
| 420 Moriarty WP-2 & 3 | Moriarty | 75 | | | | 0-6" C,SIC | 6-60" C |
| | | | 1,964 | 2,491 | 4,455* | | |
| | | | 248 | 1,065 | 1,313** | | |
| 421 Glenberg-Fluvents WP-2 | Glenberg | 55 | | | | 0-4" FSL | 4-60" Stratified L,FSL |
| | Fluvents | 20 | | | | Unstable | |
| | | | 947 | 979 | 1,926 | | |
| 643 Marcial-Pajarito SD | Marcial | 45 | | | | 0-2" SICL | 2-28" SICL, C<br>28-60" CL, L |
| | Pajarito | 35 | | | | 0-6" LFS | 6-38" SL<br>38-60" SL |
| | | | 2,797 | 1,275 | 4,072 | | |
| 651 Mimbres SD | Mimbres | 85 | | | | 0-3" SIL | 3-19" SIL<br>19-60" SIL,FSL,FS |
| | | | 11,574 | 5,181 | 16,755 | | |
| 724 Manzano CP | Manzano | | | | | 0-5" SICL | 5-37" SCL<br>37-60" SCL |
| | | | 2,628 | 4,414 | 7,042 | | |
| 755 Tours CP | Tours | | | | | 0-6" FSL | 6-60" L, CL |
| | | | 1,785 | 5,010 | 6,795 | | |
| **Deep Sand** | | | | | | | |
| 620 Bluepoint SD | Bluepoint | 85 | | | | 0-4" S | 4-39" FS, GRS<br>39-60" S |
| | | | 7,862 | 9,632 | 17,494 | | |
| 640 Pintura SD | Pintura | 90 | | | | 0-10" FS | 10-60" FS |
| | | | 14,074 | 1,165 | 15,239 | | |
| 644 Pintura-Yesum SD | Pintura | 60 | | | | 0-9" FS | 9-60" FS |
| | Yesum | 30 | | | | 0-6" VFSL | 6-60" SCL, SL |
| | | | 1,303 | 341 | 1,644 | | |
| **Gravelly** | | | | | | | |
| 440 Ildefonso-Clovis WP-3 | Ildefonso | 45 | | | | 0-2" GRSL | 2-11" GRSL<br>11-60" GR,VGRSL |
| | Clovis | 30 | | | | 0-4" FSL | 4-26" SCL<br>26-60" FSL |
| | | | 2,666 | 282 | 2,948 | | |
| 441 Ildefonso WP-3 | Ildefonso | 45<br>30 | | | | 0-2" GRL | 2-22" VGRL, VGRSL<br>22-60" VGRSL |
| | | | 14,450 | 9,522 | 23,972 | | |
| 449 Ildefonso-Scholle WP-3 | Ildefonso | 45 | | | | 0-4" GRSL | 4-15" VGRL<br>15-60" VGRSL |
| | Scholle | 30 | | | | 0-5" GRL | 5-27" GRCL<br>27-60" GRL |
| | | | 13,909 | 4,062 | 17,971 | | |

TABLE 2-8

PHYSICAL PARAMETERS OF SOILS

| F Permeability of Most Restrictive Layer | G Available Water Capacity (in./in.) | H Drainage | I Slope % | J % Coarse Fragments ( 3 in.) | K WEG | L K | M Hydro-logic Group | N Restrictive Layer & Depth | O pH Range | P Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Basalt Rock Outcrop | | 0 |
| | | | 25-100 | 15-90 | 8 | | | | | *** |
| 0.6-2.0 | 0.13-0.15 | Well | 8-25 | 15-35 | 8 | .20 | D | Basalt Bedrock 11" | | 800 |
| 0.6-2.0 | 0.12-0.16 | Well | 5-15 | 15-35 | 8 | .28 | D | Basalt Bedrock 16" | | 750 |
| | | | | | | | D | | | 0 |
| .06 | 0.12-0.14 | Well | 0-5 | 0-15 | 4 | .37 | 0 | None | | 1,000 |
| 2.0-6.0 | 0.09-0.13 | Well | 0-5 | 0-25 | 3 | .24 | B | None | 7.2-8.2 | 1,600 |
| | | | | | | | | | | *** |
| 0.06-0.2 | 0.04-0.12 | Moderately Well | 0-1 | 0-15 | 4L | .37 | 0 | Gypsum 32" | 7.2-8.6 | 500 |
| 2.0-6.0 | 0.13-0.15 | Well | 1-3 | 0-15 | 2 | .17 .32 | B | Gypsum 38" | | 500 |
| 0.6-2.0 | 0.13-0.19 | Well | 1-3 | 0-15 | 6 | .43 .28 | C | None | 7.6-8.8 | 450 |
| 0.2-2.0 | 0.19-0.21 | Well | 0-5 | 0-15 | 6 | .28 | C | None | | 2,500 |
| 0.2-0.6 | 0.16-0.21 | Well | 1-3 | 0-15 | 3 | | B | None | 7.6-8.2 | 475 |
| 6.0-20 | 0.07 | Somewhat Excessively | 1-5 | 0-35 | 2 | .17 | A | None | | 425 |
| 6.0-20 | 0.05-0.08 | Somewhat Excessively | 1-3 | 0-15 | 2 | .20 | A | None | 7.2 | 450 |
| 6.0-20 | 0.05-0.08 | Somewhat Excessively | 1-3 | 0-15 | 2 | .20 | A | None | | 450 |
| 0.6-2.0 | 0.08-0.16 | Well | 1-3 | 0-15 | 2 | .43 | A | Gypsum at 6" | | 400 |
| 2.0-6.0 | 0.06-0.08 | Well | 5-15 | 15-60 | 5 | .15 | B | Coarse Fragments Throughout - Cal. | 7.8-8.6 | 800 |
| 0.6-2.0 | 0.13-0.20 | Well | 3-8 | 0-15 | 3 | .24 | B | None | | 750 |
| 2.0-6.0 | 0.06-0.08 | Well | 8-15 15-30 | 15-60 | 5 | .15 | B | Coarse Fragments Throughout - Cal. | | 800 |
| 2.0-6.0 | 0.06-0.08 | Well | 1-15 | 15-60 | 8 | .15 | B | 15-60" Strongly Calcareous-Gravel Throughout | | 800 |
| 0.6-2.0 | 0.13-0.15 | Well | 1-8 | 15-35 | 7 | .28 | B | 27-60" Strongly Calcareous-Gravel Throughout | 7.2-9.2 | 1,050 |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | B | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| 451 Nehar WP-3 | Nehar | 60<br>25 | 898 | 2,371 | 3,269 | 0-5" GRL | 5-26" VGRCL, C<br>26-60" COBL |
| 622 Delnorte-Nickel SD | Delnorte | 45 | | | | 0-2" VGRL | 2-12" VGRL<br>12-28" Indurated Caliche<br>28-60" EXGRLCOS |
| | Nickel | 40 | 4,094 | 1,629 | 5,723 | 0-3" VGRFSL | LCOS, VGRLCOS<br>3-60" VGRFSL,VGRS, EXGRLS |
| 649 Nickel-Chamberino SD | Nickel | 45 | | | | 0-8" VGRSL | 8-60" EXGRL<br>VGRSL |
| | Chamberino | 40 | 57,697 | 14,520 | 72,217 | 0-2" GRL | 2-49" VGRL, EXGRL<br>49-60" EXGRS |
| 650 Pinaleno SD | Pinaleno | 85 | 10,468 | 1,309 | 11,777 | 0-2" GRSL | 2-32" VGRSL<br>32-60" VGRSL |
| 652 Caliza-Nickel SD | Caliza | 45 | | | | 0-3" VGRSL | 3-48" GRSL, L<br>48-60" SCL |
| | Nickel | 30 | 37,779 | 6,640 | 44,419 | 0-3" VGRSL | 3-22" VGRCOSL<br>22-43" VGRLS, S<br>43-60" GRSL, LS |
| 655 Nolam-Pinaleno SD | Nolam | 45 | | | | 0-4" GRSL | 4-20" GRSCL,VGRSCL<br>20-60" VGRLCOS |
| | Pinaleno | 35 | 17,633 | 11,132 | 28,765 | 0-4" VGRSL | 4-24" GRL, EXGRSL<br>24-60" EXGRLS |
| 749 Ildefonso CP | Ildefonso | | 4,168 | 2,224 | 6,392 | 0-3" GRFSL | 3-10" GRL<br>10-60" VGRFSL,VGRL |
| Gypsum | | | | | | | |
| 646 Holloman-Gypsum land SD | Holloman<br>Gypsum land | 55<br>30 | 6,599 | 2,619 | 9,218 | 0-6" L | 6-60" Gypsum |
| 736 Neeto-Deama-Harvey CP | Neeto<br>Deama | 35<br>30 | | | | 0-2" L<br>0-3" GRL | 2-8" L<br>3-13" VGRL |
| | Harvey | 25 | 18,126 | 21,022 | 39,148 | 0-3" L | 3-18" L<br>18-60" L |
| Gypsum Flats | | | | | | | |
| 476 Gypsiorthids WP-2 | Gypsiorthids | 70 | 122 | 222 | 344 | Var. Gypsum Crystals | |
| Gypusm Hills | | | | | | | |
| 787 Gypsum land, Steep CP | Gypsum land, Steep | | 12,918 | 5,314 | 18,232 | Gypsum | |
| Hills | | | | | | | |
| 404 Santa Fe-Rock Outcrop WP-3 | Santa Fe<br>Rock Outcrop | 55<br>30 | 18,434 | 6,769 | 25,203 | 0-7" COBL | 7-14" COBCL |
| 442 Luzena-Rock Outcrop WP-3 | Luzena<br>Rock Outcrop | 50<br>25 | 18,868 | 7,262 | 26,130 | 0-3" COBL | 3-18" GRSCL, C |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| F Permeability of Most Restrictive Layer | G Available Water Capacity (in./in.) | H Drainage | I Slope % | J % Coarse Fragments ( 3 in.) | K WEG | L K | M Hydro-logic Group | N Restrictive Layer & Depth | O pH Range | P Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.2-0.6 | 0.2-6.0 | Well | 15-25<br>8-15 | 15-60 | 8 | .17 | B | Coarse Fragments Throughout | 7.2-8.6 | 1,650 |
| 0.6-2.0 | 0.06-0.12 | Well to Excessively | 1-20 | 0-90 | 8 | .10 | C | 12-28" Indurated Caliche-Coarse Fragments Throughout | 7.2-8.4 | 250 |
| 2.0-6.0 | 0.04-0.09 | Well | 1-20 | 35-90 | 8 | .17 | B | Coarse Fragments Throughout - Cal. | 7.2-8.4 | 750 |
| 2.0-6.0 | 0.04-0.10 | Well | 1-20 | 35-90 | 8 | .17 | B | Coarse Fragments Throughout - Cal. | 7.2-8.4 | 750 |
| 0.6-6.0 | 0.04-0.10 | Well | 1-9 | 15-90 | 8 | .24<br>.17 | B | Coarse Fragments Throughout - Cal. | 7.4-8.8 | 375 |
| 2.0-6.0 | 0.04-0.09 | Well | 3-30 | 15-60 | 8 | .37 | 8 | Coarse Fragments Throughout | | 600 |
| 2.0-6.0 | 0.05-0.10 | Well | 3-10 | 0-60 | 8 | .17<br>.10 | B | Coarse Fragments Throughout - Cal. | 7.4-8.8 | 175 |
| 2.0-6.0 | 0.04-0.09 | Well | 3-10 | 0-60 | 8 | .17 | B | Coarse Fragments Throughout - Cal. | 7.2-8.4 | 750 |
| 0.6-2.0 | 0.04-0.08 | Well | 1-15 | 15-60 | 8 | .17 | B | Coarse Fragments Throughout | 7.2-7.8 | 525 |
| 2.0-6.0 | 0.03-0.09 | Well | 1-15 | 15-70 | 8 | .17 | B | Coarse Fragments Throughout | 7.2 | 600 |
| 0.6-6.0 | 0.06-0.15 | Well | 1-30 | 15-60 | 8 | .15 | B | Coarse Fragments Throughout Strongly Cal. | | 800 |
| 0.6-2.0 | 0.12-0.14 | Well | 1-5<br>1-5 | 0-15 | 4L | .37 | C | 6" Gypsum | 7.8-8.3 | 500<br>0 |
| 0.6-2.0 | 0.16-0.18 | Well | 3-12 | 0-15 | 4L | .49 | C | 8" Gypsum | | 800 |
| 0.6-2.0 | 0.10-0.12 | Well | 3-15 | 15-65 | 8 | .28 | C | Limestone Bedrock 13" | | 800 |
| 0.6-2.0 | 0.16-0.18 | Well | 3-5 | 0-15 | 4L | .37 | B | Calcareous | | 750 |
| | | | 1-15 | | | | | Has Inclusions of Strongly Saline Soils-Gypsum | | *** |
| | | | 25-100 | | | | | Gypsum 4" | | 0 |
| 0.6-2.0 | 0.08-0.10 | Well | 30-60 | 15-35 | 8 | .20 | D<br>D | Igneous Bedrock 14" | | 900<br>0 |
| 0.06-0.2 | 0.10-0.14 | Well | 30-50 | 15-35 | 8 | .32 | D<br>D | Igneous Bedrock 18" | 7.2 | 1,000<br>0 |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | B | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| 483 Sedillo-Rock Outcrop WP-3 | Sedillo | 50 | | | | 0-5" VGRL | 5-19" EXGRCL,VGRL<br>19-60" EXGRSL,VGRLS |
| | Rock Outcrop | 25 | 296 | 3,151 | 3,447 | | |
| 785 Orthents-Rock Outcrop CP | Orthents | 55 | | | | Variable | |
| | Rock Outcrop | 35 | 36,487 | 15,711 | 52,198 | | |
| 786 Rock Outcrop-Badlands CP | Rock Outcrop | 40 | | | | | |
| | Badlands | 40 | 14,037 | 7,614 | 21,651 | | |
| **Igneous Hills** | | | | | | | |
| 689 Rock Outcrop-Orthids SD | Rock Outcrop | 50 | | | | | |
| | Orthids | 30 | 4,647 | 2,851 | 7,498 | GRL | Variable |
| **Limestone Hills** | | | | | | | |
| 432 Deama-Rock Outcrop WP-2 & 3 | Deama | 50 | | | | 0-4" VGRL | 4-11" VGRL |
| | Rock Outcrop | 30 | 4,569<br>6,279 | 6,717<br>3,196 | 11,286*<br>9,475** | | |
| 482 Rock Outcrop-Deama WP-2 | Rock Outcrop | 50 | | | | | |
| | Deama | 30 | 18,464 | 7,230 | 25,694 | 0-4" VGRL | 4-15" GRL |
| 634 Lozier-Rock Outcrop | Lozier | 45 | | | | 0-2" VGRSL | 2-11" VGRL |
| | Rock Outcrop | 30 | 29,860 | 9,317 | 39,176 | | |
| 723 Deama-Rock Outcrop CP | Deama | 55 | | | | 0-3" VGRL | 3-14" GRL<br>14-18" VGRCL |
| | Rock Outcrop | 30 | 361 | 255 | 616 | | |
| 731 Deama-Harvey CP | Deama | 45 | | | | 0-3" STVFSL | 3-10" STL |
| | Harvey | 35 | 4,557 | 3,237 | 7,794 | 0-14" VFSL | 14-28" L<br>28-60" L, SCL |
| 732 Deama-Rock Outcrop CP | Deama | 45 | | | | 0-3" STVFSL | 3-10" STL |
| | Rock Outcrop | 35 | 27,335 | 8,053 | 35,388 | | |
| 781 Rock Outcrop CP | Rock Outcrop | | 494 | 373 | 867 | | |
| **Loamy** | | | | | | | |
| 410 Penistaja WP-2 | Penistaja | 60 | 358 | 690 | 1,048 | 0-4" F,VFSL,L | 4-23" SCL<br>23-60" CL |
| 415 Hagerman-Encierro WP-2 | Hagerman | 45 | | | | 0-3" FSL | 3-24" SCL |
| | Encierro | 35 | 97 | 0 | 97 | 0-3" COB,GR,FSL | 3-12" CL, SC |
| 418 LaFonda-Moenkopie WP-2 & 3 | LaFonda | 40 | | | | 0-3" L | 3-42" CL, SICL<br>42-60" SICL, CL |
| | Moenkopie | 25 | 2,340<br>1,587 | 4,226<br>978 | 6,567*<br>2,565** | 0-4" L | 4-16" L |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| F Permeability of Most Restrictive Layer | G Available Water Capacity (in./in.) | H Drainage | I Slope % | J % Coarse Fragments ( 3 in.) | K WEG | L K | M Hydro-logic Group | N Restrictive Layer & Depth | O pH Range | P Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.2-0.6 | 0.07-0.11 | Well | 20-45 | 35-70 | 8 | .17 | B | Coarse Fragments Throughout | | 700 |
| | | | | | | | 0 | | | 0 |
| | | | 8-15 | | | | | Underlain by Shale | | *** |
| | | | 15-50 | | | | 0 | | | 0 |
| | | | | | | | 0 | | | 0 |
| | | | 25-100 | | | | | | | 0 |
| | | | | | | | 0 | | | 0 |
| | | | 25-60 | | | | | Bedrock 40" | | *** |
| 0.6-2.0 | 0.10-0.12 | Well | 5-55 | 35-60 | 8 | .28 | C | Limestone Bedrock 11" | | WP-2=650 WP-3=950 |
| | | | | | | | 0 | | | 0 |
| | | | | | | | 0 | | | 0 |
| 0.6-2.0 | 0.10-0.12 | Well | 30-55 | 35-60 | 8 | .28 | C | Limestone Bedrock 15" | | 650 |
| 0.6-2.0 | 0.05-0.10 | Well | 15-50 | 35-60 | 8 | .10 | 0 | Strongly Cal. Limestone Bedrock 11" | | 500 |
| | | | | | | | 0 | | | 0 |
| 0.6-2.0 | 0.10-0.12 | Well | 5-30 | 15-60 | 8 | .28 | C | Limestone Bedrock 18" | | 700 |
| | | | | | | | 0 | | | 0 |
| 0.6-2.0 | 0.10-0.12 | Well | 1-15 | 15-35 | 8 | .28 | C | Limestone Bedrock 10" | | 700 |
| 0.6-2.0 | 0.11-0.16 | Well | 1-15 | 0-15 | 3 | .37 | 8 | Strongly Cal. | | 750 |
| 0.6-2.0 | 0.10-0.12 | Well | 30-50 | 15-35 | 8 | .28 | C | Limestone Bedrock 10" | 7.8-8.5 | 700 |
| | | | | | | | 0 | | | 0 |
| | | | | | | | 0 | | | 0 |
| 0.6-2.0 | 0.12-0.15 | Well | 1-5 | 0-15 | 3 | .24 | B | Calcareous | | 650 |
| 0.6-2.0 | 0.14-0.16 | Well | 1-15 | 0-35 | 3 | .32 | C | Sandstone Bedrock 24" | | 700 |
| 0.06-0.2 | 0.10-0.16 | Well | 1-15 | 0-35 | | .28 | 0 | Sandstone Bedrock 12" | | 700 |
| 0.6-2.0 | 0.15-0.20 | Well | 2-8 | 0-15 | 4L | .43 | B | None | | 700 |
| 0.6-2.0 | 0.16-0.18 | Well | 8-15 | 0-15 | 4L | .43 | 0 | Sandstone Bedrock 16" | | 550 |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | 8 | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| 419 LaFonda-Moriarty WP-2 & 3 | LaFonda | 45 | | | | 0-3" L | 3-42" CL, SICL<br>42-60" SICL |
| | Moriarty | 25 | | | | 0-3" CL | 3-60" CL |
| | Moriarty, flooded | 15 | | | | | |
| | | | 12,980 | 18,703 | 31,683* | | |
| | | | 11,296 | 16,070 | 27,366** | | |
| 446 Harvey WP-2 & 3 | Harvey | 75 | | | | 0-5" L | 5-17" CL<br>17-60" CL |
| | | | 3,952 | 5,904 | 9,856* | | |
| | | | 4,881 | 975 | 5,856** | | |
| 410 Cerrillos-Penistaja-Clovis WP-3 | Cerrillos | 30 | | | | 0-3" FSL | 3-20" CL<br>20-60" SCL |
| | Penistaja | 30 | | | | 0-3" FSL | 3-25" SCL<br>25-60" FSL |
| | Clovis | 20 | | | | 0-4" FSL | 4-24" SCL<br>24-60" FSL |
| | | | 5,669 | 1,012 | 6,681 | | |
| 421 Glenberg-Fluvents WP-3 | Glenberg | 50 | | | | 0-10" VFSL | 10-60" Stratified FSL, L |
| | Fluvents | 40 | | | | 0-60" Stratified GRLS, S | |
| | | | 1,202 | 169 | 1,371 | | |
| 445 Millett-Sedillo WP-3 | Millett | 40 | | | | 0-3" GRFSL | 3-17" GRCL<br>17-60" VGRL,VGRFSL |
| | Sedillo | 30 | | | | 0-3" VGRL | 3-19" VGRCL,VGRSCL<br>19-60" VGRFSL |
| | | | 6,792 | 8,719 | 15,511 | | |
| 453 Millett WP-3 | Millett | 85 | | | | 0-4" L | 4-16" CL, GRCL<br>16-60" VGRLS |
| | | | 10,137 | 4,849 | 14,986 | | |
| 467 Milligan WP-3 | Milligan | 45 | | | | 0-8" GRL | 8-25" GRL,GRSL<br>25-38" VGRSL |
| | Milligan | 30 | | | | | |
| | | | 5,666 | 2,920 | 8,585 | | |
| 710 Cerrillos-Penistaja-Clovis CP | Cerrillos | 35 | | | | 0-3" FSL | 3-15" CL<br>15-60" L |
| | Penistaja | 30 | | | | 0-6" VFSL | 6-38" CL<br>38-60" L |
| | Clovis | 25 | | | | 0-7" FSL, VFSL | 7-23" SCL<br>23-60" L |
| | | | 1,915 | 3,927 | 5,842 | | |
| 716 Hagerman-Rizozo CP | Hagerman | 40 | | | | 0-3" VFSL | 3-19" CL<br>19-26" L |
| | Rizozo | 35 | | | | 0-3" FSL | 3-14" L, GRL |
| | | | 3,990 | 1,251 | 5,241 | | |
| 719 La Fonda CP | La Fonda | 85 | | | | 0-4" L | 4-20" L, CL<br>20-60" L |
| | | | 5,739 | 3,534 | 9,273 | | |
| 735 Rance-Neeto-Gypsum land CP | Rance | 55 | | | | 0-3" VFSL | 3-22" SIL, L<br>22" Gypsum |
| | Neeto | 20 | | | | 0-12" FSL | 12" Gypsum |
| | Gypsum land | 15 | | | | Fine Granular Material to Massive Gypsum | |
| | | | 7,333 | 5,253 | 12,585 | | |
| 737 Harvey-La Fonda CP | Harvey | 40 | | | | 0-3" SL | 3-11" SL, SCL<br>11-60" VFSL, FSCL |
| | La Fonda | 35 | | | | 0-3" SL | 3-17" L, VFSL<br>17-60" L |
| | | | 5,096 | 6,916 | 12,012 | | |
| 738 Harvey-Oean CP | Harvey | 50 | | | | 0-4" VFSL | 4-18" L<br>18-60" L, SCL |
| | Oean | 30 | | | | 0-3" GRVFSL | 3-60" GRL |
| | | | 1,478 | 491 | 1,969 | | |
| 748 Harvey-Ildefonso CP | Harvey | 60 | | | | 0-2" L | 2-15" L<br>15-60" L |
| | Ildefonso | 30 | | | | 0-3" GRFSL | 3-11" GRFSL<br>11-60" VGRFSL |
| | | | 1,673 | 5,186 | 6,859 | | |
| 625 Anway SO | Anway | 85 | | | | 0-4" FSL | 4-16" CL, L<br>16-60" L, CL |
| | | | 4,585 | 889 | 5,474 | | |

TABLE 2-B (continued)

PHYSICAL PARAMETERS OF SOILS

| F Permeability of Most Restrictive Layer | G Available Water Capacity (in./in.) | H Drainage | I Slope % | J % Coarse Fragments ( 3 in.) | K WEG | L K | M Hydro-logic Group | N Restrictive Layer & Depth | O pH Range | P Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.6-2.0 | 0.15-0.20 | Well | 0-10 | 0-15 | 4L | .43 | B | None | | 700 |
| 0.06 | 0.12-0.14 | Well | 0-4<br>0-1 | 0-15 | 4 | .37 | 0 | None<br>Flooded | 7.4-9.2 | 1,000<br>2,100 |
| 0.6-2.0 | 0.14-0.18 | Well | 1-8 | 0-15 | 4L | .37 | 8 | Calcareous | | WP-2=600<br>WP-3=750 |
| 0.6-2.0 | 0.13-0.20 | Well | 1-10 | 0-15 | 3 | .37 | 8 | Strongly Calcareous 20-60" | | 750 |
| 0.6-2.0 | 0.13-0.16 | Well | 1-6 | 0-15 | 3 | .24 | 8 | Calcareous 25-60" | | 650 |
| 0.6-2.0 | 0.13-0.20 | Well | 1-5 | 0-15 | 3 | .24 | B | Strongly Calcareous 24-60" | 7.8-9.0 | 750 |
| 2.0-6.0 | 0.09-0.13 | Well | 0-5 | 0-25 | 3 | .24 | 8 | Calcareous | | 1,600 |
| | | | 0-5 | 0-35 | | | | | | *** |
| 0.6-2.0 | 0.09-0.14 | Well | 1-15 | 15-60 | | | 8 | Calcareous 17-60" | | 600 |
| 0.2-0.6 | 0.07-0.15 | Well | 1-15 | 15-60 | B | .17 | B | Calcareous 19-60" Coarse Fragments Throughout | | 700 |
| 0.6-2.0 | 0.05-0.15 | Well | 0-5 | 0-60 | 5 | | 8 | Coarse Fragments Throughout | | 600 |
| 0.6-6.0 | 0.11-0.13 | Well | 0-30<br>0-10 | 0-60 | 5 | | 8 | Strongly Cal. 25" | | 625<br>650 |
| 0.6-2.0 | 0.13-0.20 | Well | 1-10 | 0-15 | 3 | .37 | B | Calcareous 15-60" | | 750 |
| 0.6-2.0 | 0.13-0.20 | Well | 1-9 | 0-15 | 3 | .24 | B | None | | 1,000 |
| 0.6-2.0 | 0.13-0.20 | Well | 1-8 | 0-15 | 3 | .24 | B | Calcareous | | 900 |
| 0.6-2.0 | 0.14-0.16 | Well | 1-8 | 0-15 | 3 | .32 | C | Sandstone Bedrock 26" | | 750 |
| 2.0-6.0 | 0.11-0.16 | Well | 1-15 | 0-35 | 3 | .32 | 0 | Sandstone Bedrock 14" | | 650 |
| 0.6-2.0 | 0.15-0.20 | Well | 1-10 | 0-15 | 4L | .43 | 8 | None | | 700 |
| 0.6-2.0 | 0.13-0.15 | Well | 1-5 | 0-15 | 4L | .49 | C | Soft Gypsum 22" | | 800 |
| 2.0-6.0 | 0.12-0.15 | Well | 2-15 | 0-15 | 3 | .37 | C | Gypsum 12" | | 800<br>0 |
| 0.6-2.0 | 0.11-0.16 | Well | 8-15 | 0-15 | 3 | .37 | 8 | Calcareous | | 750 |
| 0.6-2.0 | 0.15-0.19 | Well | 3-15 | 0-15 | 3 | .43 | B | None | 7.8-8.8 | 700 |
| 0.6-2.0 | 0.11-0.18 | Well | 1-9 | 0-15 | 3 | .37 | B | Calcareous 18-60" | | 750 |
| 0.6-2.0 | 0.11-0.17 | Well | 1-9 | 0-35 | 4L | .32 | C | Strongly Calcareous 3-60" | 8.2-8.4 | 600 |
| 0.6-2.0 | 0.16-0.18 | Well | 1-8 | 0-15 | 4L | .37 | B | Calcareous 15-60" | | 750 |
| 2.0-6.0 | 0.06-0.08 | Well | 1-8 | 15-60 | 5 | .15 | B | Coarse Fragments Throughout - Cal. | | 800 |
| 0.2-0.6 | 0.11-0.21 | Well | 1-3 | 0-15 | 3 | .32<br>.28 | B | None | 7.2-8.4 | 600 |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | B | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| 636 Reeves-Holloman SD | Reeves | 50 | | | | 0-4" FSL | 4-16" L<br>16-28" L, CL |
| | Holloman | 30 | 5,394 | 3,457 | 8,851 | 0-7" VFSL | |
| 641 Turney SD | Turney | 85 | 10,525 | 1,859 | 12,384 | 0-7" L | 7-19" SCL, CL<br>19-60" CL, L |
| 648 Tome SD | Tome | 50 | 3,482 | 596 | 4,078 | 0-4" L | 4-60" Stratified SIL, SICL |
| 653 Adelino-Ubar SD | Adelino | 45 | | | | 0-3" FSL | 3-22" SCL<br>22-49" CL<br>49-60" VFSL |
| | Ubar | 35 | 4,975 | 2,790 | 7,765 | 0-3" SIL | 3-43" SICL, C<br>43-60" LFS |
| **Malpais** | | | | | | | |
| 405 Cabezon-Thunder-bird-Apache WP-2 & 3 | Cabezon | 35 | | | | 0-4" STL | 4-12" CO8CL |
| | Thunderbird | 30 | | | | 0-4" STCL | 4-29" CO8C |
| | Apache | 20 | 10,911<br>413 | 15,877<br>208 | 26,788*<br>621** | 0-8" CO8L | 8-13" CO8CL |
| 406 Cabezon-Apache-Rock Outcrop WP-2 | Cabezon | 35 | | | | 0-3" STL | 3-14" GR,CO8,STCL |
| | Apache | 30 | | | | 0-4" STL, CO8L | 4-16" STL, CO8L |
| | Rock Outcrop | 25 | 23,273 | 29,198 | 52,471 | | |
| 657 Akela-Rock Outcrop SD | Akela | 40 | | | | 0-11" VGRL | |
| | Rock Outcrop | 35 | | | | | |
| | Vekol | 20 | 14,748 | 2,930 | 17,678 | 0-2" L | |
| 705 Apache-Cabezon CP | Apache | 65 | | | | 0-3" STL | 3-10" GRL<br>10-17" CO8L |
| | Cabezon | 30 | 2,770 | 1,163 | 3,933 | 0-3" STL | 3-15" C |
| 784 Rock Outcrop-Apache CP | Rock Outcrop | 40 | | | | | |
| | Apache | 35 | 315 | 61 | 376 | 0-3" CO8L | 3-10" GRL<br>10-17" CO8L |
| **Sandstone Hills** | | | | | | | |
| 483 Rock Outcrop-Rizozo WP-2 | Rock Outcrop | 60 | | | | | |
| | Rizozo | 20 | 5,113 | 5,202 | 10,315 | 0-4" STFSL | 4-16" GR, STL |
| **Sandy** | | | | | | | |
| 422 Otero-Glenberg WP- 2 & 3 | Otero | 40 | | | | 0-11" FSL | 11-60" FSL |
| | Glenberg | 40 | 229<br>50 | 224<br>320 | 453*<br>370** | 0-10" FSL | 10-60" Stratified Usually L |
| 455 Penistaja-Palma WP-2 & 3 | Penistaja | 40 | | | | 0-11" LFS | 11-28" SCL<br>28-60" SL, SCL |
| | Palma | 30 | 4,989<br>1,142 | 6,735<br>1,810 | 11,724*<br>2,952** | 0-10" LFS | 10-28" FSL<br>28-60" FSL,SL,LFS |
| 623 Pajarito-Harrisburg SD | Pajarito | 40 | | | | 0-4" FSL | 4-11" FSL<br>11-60" FSL |
| | Harrisburg | 35 | 7,684 | 1,335 | 9,019 | 0-4" LFS | 4-27" SL, FSL<br>27" Hard Caliche |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| F<br>Permeability of Most Restrictive Layer | G<br>Available Water Capacity (in./in.) | H<br>Drainage | I<br>Slope % | J<br>% Coarse Fragments ( 3 in.) | K<br>WEG | L<br>K | M<br>Hydro-logic Group | N<br>Restrictive Layer & Depth | O<br>pH Range | P<br>Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.6-2.0 | 0.12-0.19 | Well | 1-5 | 0-15 | 4L | .49 | C | Gypsum 28" | 7.4-8.2 | 500 |
| 0.6-2.0 | 0.12-0.14 | Well | 1-8 | 0-15 | 4L | .49 | C | Gypsum 7" | | 500 |
| 0.6-2.0 | 0.05-0.17 | Well | 0-5 | 0-15 | 4L | .32 | B | None | 7.6-9.0 | 300 |
| 0.2-0.6 | 0.18-0.20 | Well | 0-3 | 0-15 | 4L | .43 | C | None | | 1,500 |
| 0.6-2.0 | 0.13-0.18 | Well | 1-3 | 0-15 | 3 | .28 | C | None | | 475 |
| 0.06-0.2 | 0.15-0.20 | Well | 1-3 | 0-15 | 6 | .49<br>.43 | C | None | | 1,800 |
| 0.6-2.0 | 0.13-0.15 | Well | 3-8 | 15-35 | 8 | .20 | D | Basalt Bedrock 12" | | 800 |
| 0.2-0.6 | 0.09-0.11 | Well | 0-3 | 15-35 | 8 | .32 | D | Basalt Bedrock 29" | 7.2-8.2 | 800 |
| 0.6-2.0 | 0.12-0.16 | Well | 3-10 | 15-35 | 8 | .28 | D | Basalt Bedrock 13" | | 800 |
| 0.6-2.0 | 0.13-0.15 | Well | 15-55 | 15-35 | 8 | .20 | D | Basalt Bedrock 14" | | 800 |
| 0.6-2.0 | 0.12-0.16 | Well | 15-55 | 15-35 | 8 | .28 | O | Basalt Bedrock 16" | | 800 |
| | | | | | | | | Strongly Calcareous 4-16" | | |
| | | | | | | | O | | | 0 |
| 0.6-2.0 | 0.05-0.10 | Well | 3-B | 15-35 | 7 | .28 | D | Bedrock 11" | 7.6-8.2 | 400 |
| | | | | | | | O | | | 0 |
| | | Well | 0-2 | | | .55 | O | | | 1,100 |
| 0.6-2.0 | 0.12-0.16 | Well | 3-15 | 15-35 | 8 | .20 | D | Basalt Bedrock 17" | 7.2-8.0 | 800 |
| | | | | | | | | Strongly Calcareous 3-17" | | |
| 0.06-0.6 | 0.12-0.15 | Well | 1-10 | 0-35 | 8 | .20 | O | Basalt Bedrock 15" | 7.2-7.6 | 500 |
| | | | | | | | D | | | 0 |
| 0.6-2.0 | 0.12-0.16 | Well | 8-15 | 15-35 | 8 | .28 | O | Basalt Bedrock 17" | | 800 |
| | | | | | | | D | | | 0 |
| 2.0-6.0 | 0.11-0.16 | Well | 55-100 | 15-35 | 8 | .32 | D | Sandstone Bedrock 16" | | 800 |
| 6.0-20 | 0.09-0.13 | Somewhat Excessively | 0-5 | 0-15 | 3 | .10 | B | Calcareous Throughout | | 1,000 |
| 2.0-6.0 | 0.09-0.12 | Well | 3-9 | 0-15 | 3 | .24 | B | Calcareous | | 1,600 |
| 0.6-2.0 | 0.09-0.16 | Well | 1-9 | 0-15 | 2 | .17 | B | None | | 650 |
| 2.0-6.0 | 0.08-0.14 | Somewhat Excessively | 1-15 | 0-15 | 2 | .15 | B | None | | 500 |
| 2.0-6.0 | 0.13-0.15 | Well | 1-5 | 0-15 | 3 | .17<br>.32 | B | Strongly Calcareous 11" | | 500 |
| 2.0-6.0 | 0.10-0.14 | Well | 1-5 | 0-15 | 2 | .24 | C | Petrocalcic 27" | | 525 |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | B | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| 624 Pajarito-Onite SD | Pajarito | 40 | | | | 0-3" LFS | 3-19" SL<br>19-60" SL, LFS |
| | Onite | 35 | | | | 0-3" LFS | 3-15" SL<br>15-60" SL, LS |
| | | | 13,540 | 4,243 | 17,783 | | |
| 627 Oona Ana-Berino SD | Oona Ana | 50 | | | | 0-3" SL | 3-21" SL, CL<br>21-60" L, SL |
| | Berino | 30 | | | | 0-4" SL | 4-32" SCL<br>32-60" L, SCL |
| | | | 10,717 | 1,898 | 12,615 | | |
| 629 Berino-Oona Ana | Berino | 45 | | | | 0-4" SL | 4-33" SL, SCL<br>33-60" SL |
| | Oona Ana | 40 | | | | 0-3" SL | 3-17" SL, SCL<br>17-60" L, SL |
| | | | 18,044 | 7,069 | 25,113 | | |
| 632 Wink-Harrisburg SD | Wink | 50 | | | | 0-2" FS | 2-16" SL<br>16-60" SL |
| | Harrisburg | 25 | | | | 0-11" FS | 11-26" FSL<br>26" Indurated Caliche |
| | | | 16,198 | 5,536 | 21,734 | | |
| 635 Wink-Pajarito SD | Wink | 50 | | | | 0-4" LFS | 4-26" LFS<br>26-60" CL |
| | Pajarito | 35 | | | | 0-5" LFS | 5-24" SL<br>24-60" SL |
| | | | 21,114 | 6,073 | 27,187 | | |
| 637 Pajarito SD | Pajarito | 85 | | | | 0-3" LFS | 3-19" SL<br>19-60" SL, LFS |
| | | | 12,426 | 1,464 | 13,890 | | |
| 645 Pajarito-Holloman SD | Pajarito | 50 | | | | 0-11" LS | 11-60" SL |
| | Holloman | 30 | | | | 0-6" VFSL | 6-18" L of Gypsic Material<br>18-40" SL<br>40-60" Gysum S |
| | | | 7,221 | 2,842 | 10,063 | | |
| 709 Penistaja-Clovis CP | Penistaja | 50 | | | | 0-12" LFS | 12-34" SCL<br>34-60" FSL |
| | Clovis | 35 | | | | 0-10" LFS | 10-28" SCL<br>28-60" FSL |
| | | | 1,668 | 438 | 2,106 | | |
| 717 Palma CP | Palma | 40 | | | | 0-3" FSL | 3-32" FSL<br>32-60" FSL |
| | Palma | 35 | | | | 0-4" LFS | 4-22" FSL<br>22-60" SL, L |
| | | | 7,413 | 3,905 | 11,318 | | |
| 752 Piro-Pinavetes CP | Piro | 45 | | | | 0-5" S | 5-13" LS<br>13-60" SL, L |
| | Pinavetes | 35 | | | | 0-5" S | 5-60" S |
| | | | 7,960 | 2,678 | 10,638 | | |
| 756 Piro CP | Piro | | | | | 0-4" LS | 4-19" SL<br>19-60" L |
| | | | 5,164 | 918 | 6,082 | | |
| Shallow | | | | | | | |
| 431 Oeama-Harvey WP-2 & 3 | Oeama | 40 | | | | 0-4" COBL | 4-11" COBL |
| | Harvey | 25 | | | | 0-5" L | 5-17" CL<br>17-60" L |
| | Rock Outcrop | 15 | | | | | |
| | | | 477 | 1,399 | 1,876* | | |
| | | | 2,836 | 2,123 | 4,959** | | |
| 439 Pastura-Oeama WP-3 | Pastura | 50 | | | | 0-2" GRL | 2-14" GRL<br>14" Indurated Caliche |
| | Oeama | 30 | | | | 0-4" VSTL | 4-12" STL |
| | | | 4,119 | 630 | 4,749 | | |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| F Permeability of Most Restrictive Layer | G Available Water Capacity (in./in.) | H Drainage | I Slope % | J % Coarse Fragments ( 3 in.) | K WEG | L K | M Hydro-logic Group | N Restrictive Layer & Oepth | O pH Range | P Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| 2.0-6.0 | 0.09-0.15 | Well | 1-5 | 0-15 | 2 | .17 | 8 | None | | 500 |
| 2.0-6.0 | 0.06-0.15 | Well | 1-8 | 0-15 | 2 | .17 | B | None | 7.2-8.4 | 450 |
| 0.6-2.0 | 0.08-0.17 | Well | 1-5 | 0-15 | 3 | .24 | B | None | | 350 |
| 0.6-2.0 | 0.10-0.17 | Well | 1-5 | 0-15 | 3 | .24 | 8 | None | 7.0-8.4 | 350 |
| 0.6-2.0 | 0.10-0.17 | Well | 1-5 | 0-15 | 3 | .24 | 8 | None | 7.2-8.8 | 350 |
| 0.6-2.0 | 0.08-0.17 | Well | 1-5 | 0-15 | 3 | .24 | 8 | None | | 350 |
| 2.0-6.0 | 0.10-0.14 | Well | 1-5 | 0-15 | 1 | .20 | B | Calcareous | | 700 |
| 2.0-6.0 | 0.10-0.14 | Well | 3-8 | 0-15 | 1 | .24 | C | Petrocalcic 26" | | 525 |
| 2.0-6.0 | 0.10-0.15 | Well | 1-3 | 0-15 | 2 | .17 | 8 | Calcareous | | 700 |
| 2.0-6.0 | 0.08-0.15 | Well | 1-8 | 0-15 | 2 | .20 | 8 | None | | 500 |
| 2.0-6.0 | 0.09-0.15 | Well | 1-5 | 0-15 | 2 | .17 | B | None | | 500 |
| 2.0-6.0 | 0.09-0.15 | Well | 1-3 | 0-15 | 2 | .17 | 8 | None | | 500 |
| 0.6-2.0 | 0.12-0.14 | Well | 1-3 | 0-15 | 4L | .49 | C | Gypsiferous Material 6-60" | | 550 |
| 0.6-2.0 | 0.09-0.16 | Well | 0-8 | 0-15 | 2 | .17 | 8 | None | 7.2 | 650 |
| 0.6-2.0 | 0.13-0.20 | Well | 0-8 | 0-15 | 2 | .24 | 8 | Strongly Calcareous 28-60" | | 700 |
| 2.0-6.0 | 0.12-0.14 | Well to Somewhat | 1-8 | 0-15 | 3 | .24 | 8 | None | 7.2-8.8 | 1,000 |
| 2.0-6.0 | 0.08-0.14 | Excessively | 1-8 | 0-15 | 2 | .15 | 8 | None | 7.2-8.8 | 1,000 |
| 0.6-2.0 | 0.06-0.09 | Well | 1-5 | 0-15 | 1 | .15 | B | None | | 800 |
| 6.0-20.0 | 0.05-0.08 | Somewhat Excessively | 1-5 | 0-15 | 1 | .20 | A | None | 7.2 | 850 |
| 0.6-2.0 | 0.06-0.09 | Well | 1-5 | 0-15 | 2 | .15 | 8 | None | 7.2-8.6 | 800 |
| 0.6-2.0 | 0.10-0.12 | Well | 8-30 | 15-35 | 8 | .28 | C | Limestone Bedrock 11" Strongly Calcareous | | WP-2=650 WP-3=950 |
| 0.6-2.0 | 0.14-0.18 | Well | 3-8 | 0-15 | 4L | .37 | B D | Calcareous | | WP-2=600 WP-3=750 0 |
| 0.6-2.0 | 0.10-0.13 | Well | 1-8 | 15-35 | 4L | .32 | 0 | Petrocalcic 14" | 7.6-8.8 | 950 |
| 0.6-2.0 | 0.10-0.12 | Well | 5-15 | 15-60 | 8 | .28 | C | Limestone Bedrock 12" | | 950 |

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| RANGE SITE | A | B | C | | | D | E |
|---|---|---|---|---|---|---|---|
| Soil Mapping Unit and MLRA | Series | % of Unit | Acres Mapped Public | Other | Total | Surface Texture Range & Depths | Subsurface Texture Ranges & Depths |
| 459 Pastura Variant WP-3 | Pastura Var. | 75 | 3,160 | 634 | 3,794 | 0-3" GRL | 3-17" GRL<br>17" Indurated Caliche |
| 4B4 Persayo-Rock Outcrop WP-3 | Persayo | 50 | | | | 0-3" L | 3-9" CL<br>9-17" L |
| | Rock Outcrop | 25 | 7,334 | 3,089 | 10,424 | | |
| 490 Penasco WP-3 | Penasco | 55<br>30 | 1,965 | 133 | 2,098 | 0-2" VGRL | 2-12" GRL<br>12" Indurated Caliche |
| 7B3 Rock Outcrop-Rizozo CP | Rock Outcrop<br>Rizozo | 50<br>30 | 13,836 | 7,615 | 21,451 | 0-3" CHSIL | 3-14" CHSIL |
| Shallow Sandstone | | | | | | | |
| 434 Moenkopie-Rock Outcrop WP-2 | Moenkopie | 50 | | | | 0-16" SL | |
| | Rock Outcrop | 30 | 6,6B3 | 9,749 | 16,432 | | |
| Shallow Sandy | | | | | | | |
| 656 Aftaden-Rock Outcrop SD | Aftaden | 45 | | | | 0-3" LS | 3-13" FSL |
| | Rock Outcrop | 30 | 825 | 50 | 875 | | |
| No Range Site | | | | | | | |
| 485 Rock Outcrop-Orthents | Rock Outcrop<br>Orthents | 35<br>30 | 9,270 | 12,006 | 21,276 | Variable | |
| 491 Riverwash | Riverwash | | 9,360 | 10,868 | 20,228 | Unconsolidated Recent Alluvium | |
| 660 Duneland SD | Duneland | 100 | 120 | 406 | 526 | FS, LFS | |
| 687 Gypsum SD | Gypsum | | 407 | 161 | 56B | | |
| B00 Rock Outcrop-Boralfs RM | Rock Outcrop<br>Boralfs | 60<br>20 | 2,30B | 646 | 2,954 | | |

* Acreage Figures for WP-2
** Acreage Figures for WP-3
***These Soils are too Variable to Interpret.

Source: BLM Socorro District and SCS Files

TABLE 2-8 (continued)

PHYSICAL PARAMETERS OF SOILS

| F<br>Permeability of Most Restrictive Layer | G<br>Available Water Capacity (in./in.) | H<br>Drainage | I<br>Slope % | J<br>% Coarse Fragments ( 3 in.) | K<br>WEG | L<br>K | M<br>Hydro-logic Group | N<br>Restrictive Layer & Depth | O<br>pH Range | P<br>Pot. Prod. lbs./A |
|---|---|---|---|---|---|---|---|---|---|---|
| 0.6-2.0 | 0.10-0.13 | Well | 3-8 | 15-35 | 4L | .32 | D | Petrocalcic 17" | | 950 |
| 0.2-0.6 | 0.15-0.19 | Well | 5-30 | 0-15 | 4L | .37 | 0 | Weathered Shale 17" | | 500 |
| | | | | | | | D | | | 0 |
| 0.6-2.0 | 0.13-0.15 | Well | 5-15<br>10-20 | 15-60 | 8 | .24 | 0 | Petrocalcic 12" | 7.2-8.8 | 950 |
| | | | | | | | D | | | 0 |
| 2.0-6.0 | 0.11-0.16 | Well | 15-30 | 10-35 | 7 | .32 | 0 | Sandstone 14" | 7.8 | 800 |
| 2.0-6.0 | 0.11-0.13 | Well | 3-55 | 0-15 | 3 | .37 | 0 | Sandstone Bedrock 16" | | 550 |
| | | | | | | | D | | | 0 |
| 2.0-6.0 | 0.06-0.13 | Well | 1-8 | 0-15 | 2 | .17 | 0 | Basalt Bedrock 13" | 7.2-8.2 | 500 |
| | | | | | | | D | | | 0 |
| | | | 30-55 | | | | D | | | 0 |
| | | | 15-30 | | 8 | | | Coarse Fragments | | *** |
| | | | | | | | | | | *** |
| | | Excessively | 10-100 | 0-1 | | | A | None | | 0 |
| | | | | | | | | | | *** |
| | | | | | | | 0 | | | 0 |
| | | | 30-60 | | | | | | | *** |

KEY FOR TABLE 2-8

A = Component soil series in each mapping unit.

B = Percent of the mapping unit which each component series occupies. The series totals for each mapping unit will vary depending upon the amount of inclusions (which are not listed).

C = Number of acres for each mapping unit in the ES Area.

D = Surface texture abbreviations are as follows:

C = Clay
CH = Channery
COB = Cobbly
EX = Extremely
F = Fine
GR = Gravelly
L = Loam (y)
S = Sand (y)
SI = Silt (y)
ST = Stony
V = Very

E = Subsoil and substratum texture abbreviations are the same as above.

F = Soil permeability is expressed as the estimated inches/hour through saturated undisturbed cores under 1/2-inch of water. The following are the permeability classes:

| | in./hr. | Class |
|---|---|---|
| less than | 0.06 | Very Slow |
| | 0.06-0.2 | Slow |
| | 0.2 -0.6 | Moderately Slow |
| | 0.6 -2.0 | Moderate |
| | 2.0 -6.0 | Moderately rapid |
| | 6.0 -20.0 | Rapid |
| more than | 20.0 | Very Rapid |

G = The available water capacity is the ability of soil to hold water for use by most plants. It is the difference between the amount of soil water at field capacity and the amount at wilting point.

H = Soil drainage classes, as defined in the U.S.D.A. Agriculture Handbook 18, are as follows:

Moderately Well - Water is removed from the soil somewhat slowly so the profile is wet for a small but significant part of the time.

Well - Water is removed from the soil readily but not rapidly. Well drained soils commonly retain optimum amounts of moisture for plant growth after rains or additions of irrigation water.

Somewhat excessively - Water is removed from the soil rapidly. Only a narrow range of crops can be grown on these soils, and the yields are usually low without irrigation.

Excessively - Water is removed from the soil very rapidly. Enough precipitation is commonly lost from these soils to make them unsuitable for ordinary crop production.

I = Slope range for each soil series in the mapping unit.

J = This column includes only coarse fragments greater than 3 inches (i.e., gravels, cobbles, and stones).

K = Wind erodibility groups are listed in Appendix 3.

L = K is the soil erodibility factor which is used in the universal soil loss equation. It is a function of soil texture, organic matter content, and structure.

M = All the soils are placed in a hydrologic Group A through D. Soils in Group A have the lowest runoff potential and those in Group D have the highest runoff potential. These classes are defined in the glossary.

N = Restrictive layers include bedrock, petrocalcic horizons, gypsum, horizons with a high percentage of coarse fragments, and strongly calcareous or saline horizons within 40 inches of the surface.

O = pH range for each soil (this data was not available for all soils).

P = Potential productivity for a normal year (from SCS Form 5).

The following soil mapping units were mapped in Valencia County: 484-Basalt Rock Outcrop-Orthents, 420-Moriarty, 421-Glenberg-Fluvents (WP-2 and WP-3), 410-Penistaja, 415-Hagerman-Encierro, 406-Cabezon-Apache-Rock Outcrop, 483-Rock Outcrop-Rizozo, 422-Otero-Glenberg, 455-Penistaja-Palma, and 476-Gypsiorthids.

TABLE 2-9
SEDIMENT YIELD BY RANGE SITE
PAGE 1 of 2

| Range Site & MLRA | EE | | | | | PA | | | | | NA/FE* | | | | | LA | | | | | PCL/ESR | | | | | NG** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | AMP Allotments | | Non-AMP Allotments | | All Allotments | | | | | | | | | | | | | | | |
| | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) |
| Basalt Hills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | - | - | - | 8.4 | - | - | - | - | 8.4 | - | - | 2.6 | - | 5.8 | - | - | - | - | 8.4 | - | - | - | - | 8.4 | - | - | - | - | 3.9 | - |
| WP-3 | 53 | 3 | .55 | 8.2 | 4.51 | 47 | 4 | .44 | 8.2 | 3.61 | .44 | 0.0 | .55 | 8.2 | 4.51 | 48 | 4 | .45 | 8.2 | 3.69 | 46 | 4 | .42 | 8.2 | 3.44 | 37 | 4 | .30 | 5.5 | 1.65 |
| Bottomland | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 77 | 2 | 1.30 | 10.0 | 13.00 | 65 | 3 | .85 | 10.0 | 8.50 | .85 | 4.9 | 1.30 | 5.1 | 10.80 | 69 | 3 | .98 | 10.0 | 9.80 | 65 | 3 | .85 | 10.0 | 8.50 | 56 | 3 | .60 | 4.5 | 2.70 |
| WP-3 | 81 | 2 | 1.50 | 2.1 | 3.15 | 72 | 2 | 1.15 | 2.1 | 2.42 | 1.15 | 1.4 | 1.50 | 0.7 | 2.66 | 74 | 2 | 1.20 | 2.1 | 2.52 | 71 | 2 | 1.08 | 2.1 | 2.27 | 62 | 3 | .75 | 0.4 | 0.30 |
| 50 | 46 | 4 | .42 | 32.5 | 13.65 | 38 | 4 | .31 | 32.5 | 10.08 | .31 | 10.8 | .42 | 21.7 | 12.46 | 40 | 4 | .34 | 32.5 | 11.05 | 37 | 4 | .30 | 32.5 | 9.75 | 29 | 4 | .21 | 22.5 | 4.73 |
| CP | 72 | 2 | 1.15 | 21.6 | 24.84 | 61 | 3 | .73 | 21.6 | 15.77 | .73 | 0.0 | 1.15 | 21.6 | 24.84 | 65 | 3 | .85 | 21.6 | 18.36 | 60 | 3 | .70 | 21.6 | 15.12 | 52 | 3 | .53 | 6.9 | 3.66 |
| Deep Sand | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | 41 | 4 | .35 | 53.7 | 18.80 | 33 | 4 | .26 | 53.7 | 13.96 | .26 | 8.5 | .35 | 45.2 | 18.03 | 35 | 4 | .28 | 53.7 | 15.04 | 32 | 4 | .25 | 53.7 | 13.43 | 23 | 5 | .18 | 36.3 | 6.53 |
| Gravelly | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-3 | 47 | 4 | .44 | 75.3 | 33.13 | 38 | 4 | .31 | 75.3 | 23.34 | .31 | 33.3 | .44 | 42.0 | 28.80 | 40 | 4 | .34 | 75.3 | 25.60 | 36 | 4 | .29 | 75.3 | 21.84 | 27 | 4 | .20 | 49.9 | 9.98 |
| 50 | 45 | 4 | .40 | 254.5 | 101.80 | 38 | 4 | .31 | 254.5 | 78.90 | .31 | 123.9 | .40 | 130.6 | 90.65 | 39 | 4 | .33 | 254.5 | 83.99 | 36 | 4 | .29 | 254.5 | 73.81 | 27 | 4 | .20 | 199.5 | 39.90 |
| CP | 44 | 4 | .38 | 10.0 | 3.80 | 36 | 4 | .29 | 10.0 | 2.90 | .29 | 7.8 | .38 | 2.2 | 3.10 | 38 | 4 | .31 | 10.0 | 3.10 | 34 | 4 | .27 | 10.0 | 2.70 | 25 | 5 | .19 | 6.5 | 1.24 |
| Gypsum | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | 60 | 3 | .70 | 14.4 | 10.08 | 52 | 3 | .53 | 14.4 | 7.63 | .53 | 0.0 | .70 | 14.4 | 10.08 | 54 | 3 | .56 | 14.4 | 8.06 | 51 | 3 | .52 | 14.4 | 7.49 | 41 | 4 | .35 | 10.3 | 3.61 |
| CP | 60 | 3 | .70 | 61.2 | 42.84 | 51 | 3 | .52 | 61.2 | 31.82 | .52 | 5.6 | .70 | 55.6 | 41.83 | 54 | 3 | .56 | 61.2 | 34.27 | 50 | 3 | .50 | 61.2 | 30.60 | 42 | 4 | .36 | 28.3 | 10.19 |
| Gypsum Flats | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | - | - | - | 0.5 | - | - | - | - | 0.5 | - | - | 0.5 | - | 0.0 | - | - | - | - | 0.5 | - | - | - | - | 0.5 | - | - | - | - | 0.2 | - |
| Gypsum Hills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| CP | 89 | 2 | 2.05 | 28.5 | 58.43 | 81 | 2 | 1.50 | 28.5 | 42.75 | 1.50 | 8.5 | 2.05 | 20.0 | 53.75 | 83 | 2 | 1.60 | 28.5 | 45.60 | 80 | 2 | 1.45 | 28.5 | 41.33 | 70 | 2 | 1.00 | 20.2 | 20.20 |
| Hills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-3 | 63 | 3 | .79 | 85.6 | 67.62 | 54 | 3 | .56 | 85.6 | 47.94 | .56 | 5.2 | .79 | 80.4 | 66.43 | 56 | 3 | .60 | 85.6 | 51.36 | 53 | 3 | .55 | 85.6 | 47.08 | 44 | 4 | .38 | 58.7 | 22.31 |
| CP | 99 | 2 | 2.90 | 115.4 | 334.66 | 93 | 2 | 2.30 | 115.4 | 265.42 | 2.30 | 36.9 | 2.90 | 78.5 | 312.52 | 94 | 2 | 2.40 | 115.4 | 276.96 | 90 | 2 | 2.10 | 115.4 | 242.34 | 89 | 2 | 2.05 | 78.9 | 161.75 |
| Igneous Hills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 50 | - | - | - | 11.7 | - | - | - | - | 11.7 | - | - | 4.7 | - | 7.0 | - | - | - | - | 11.7 | - | - | - | - | 11.7 | - | - | - | - | 7.3 | - |
| Limestone Hills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 56 | 3 | .60 | 57.8 | 34.68 | 49 | 4 | .48 | 57.8 | 27.74 | .48 | 15.9 | .60 | 41.9 | 32.77 | 50 | 3 | .50 | 57.8 | 28.90 | 47 | 4 | .44 | 57.8 | 25.43 | 38 | 4 | .31 | 36.0 | 11.16 |
| WP-3 | 51 | 3 | .52 | 15.1 | 7.85 | 44 | 4 | .38 | 15.1 | 5.74 | .45 | 0.0 | .52 | 15.1 | 7.85 | 45 | 4 | .40 | 15.1 | 6.04 | 41 | 4 | .35 | 15.1 | 5.29 | 33 | 4 | .26 | 9.8 | 2.55 |
| 50 | 48 | 4 | .45 | 61.2 | 27.54 | 40 | 4 | .34 | 61.2 | 20.81 | .34 | 16.6 | .45 | 44.6 | 25.71 | 42 | 4 | .36 | 61.2 | 22.03 | 38 | 4 | .31 | 61.2 | 18.97 | 29 | 4 | .21 | 46.7 | 9.81 |
| CP | 53 | 3 | .55 | 69.8 | 38.39 | 45 | 4 | .40 | 69.8 | 27.92 | .40 | 16.0 | .55 | 53.8 | 35.99 | 45 | 4 | .40 | 69.8 | 27.92 | 43 | 4 | .37 | 69.8 | 25.83 | 35 | 4 | .28 | 51.2 | 14.34 |
| Loamy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 70 | 2 | 1.00 | 77.0 | 77.00 | 62 | 3 | .75 | 77.0 | 57.75 | .75 | 38.0 | 1.00 | 39.0 | 67.50 | 63 | 3 | .79 | 77.0 | 60.83 | 60 | 3 | .70 | 77.0 | 53.90 | 53 | 3 | .55 | 30.8 | 16.94 |
| WP-3 | 61 | 3 | .73 | 129.6 | 94.61 | 51 | 3 | .52 | 129.6 | 67.39 | .52 | 13.7 | .73 | 115.9 | 91.73 | 55 | 3 | .58 | 129.6 | 75.17 | 50 | 3 | .50 | 129.6 | 64.80 | 41 | 4 | .35 | 73.8 | 25.83 |
| 50 | 55 | 3 | .58 | 60.2 | 34.92 | 46 | 4 | .42 | 60.2 | 25.28 | .42 | 21.3 | .58 | 38.9 | 31.51 | 48 | 4 | .45 | 60.2 | 27.09 | 45 | 4 | .40 | 60.2 | 24.08 | 36 | 4 | .29 | 45.3 | 13.14 |
| CP | 55 | 3 | .58 | 84.0 | 48.72 | 47 | 4 | .44 | 84.0 | 36.96 | .44 | 9.6 | .58 | 74.4 | 47.37 | 48 | 4 | .45 | 84.0 | 37.80 | 45 | 4 | .40 | 84.0 | 33.60 | 37 | 4 | .30 | 42.5 | 12.75 |
| Malpais | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 59 | 3 | .68 | 123.8 | 84.20 | 49 | 4 | .48 | 123.8 | 59.42 | .48 | 60.2 | .68 | 63.6 | 72.15 | 52 | 3 | .53 | 123.8 | 65.61 | 47 | 4 | .44 | 123.8 | 54.47 | 40 | 4 | .34 | 53.4 | 18.18 |
| WP-3 | 48 | 4 | .45 | 1.0 | 0.45 | 41 | 4 | .35 | 1.0 | 0.35 | .35 | 0.0 | .45 | 1.0 | .45 | 42 | 4 | .36 | 1.0 | 0.36 | 39 | 4 | .33 | 1.0 | 0.33 | 30 | 4 | .22 | 0.6 | 0.13 |
| SO | 36 | 4 | .29 | 27.6 | 8.00 | 29 | 4 | .21 | 27.6 | 5.80 | .21 | 0.0 | .29 | 27.6 | 8.00 | 30 | 4 | .22 | 27.6 | 6.07 | 27 | 4 | .20 | 27.6 | 5.52 | 17 | 5 | .14 | 23.0 | 3.22 |
| CP | 58 | 3 | .65 | 6.7 | 4.36 | 52 | 3 | .53 | 6.7 | 3.55 | .53 | 0.0 | .65 | 6.7 | 4.36 | 53 | 3 | .55 | 6.7 | 3.69 | 50 | 3 | .50 | 6.7 | 3.35 | 41 | 4 | .35 | 4.8 | 1.68 |
| Sandstone Hills | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 56 | 3 | .60 | 16.1 | 9.66 | 48 | 4 | .45 | 16.1 | 7.25 | .45 | 5.2 | .60 | 10.9 | 8.88 | 50 | 3 | .50 | 16.1 | 8.05 | 46 | 4 | .42 | 16.1 | 6.76 | 38 | 4 | .31 | 8.0 | 2.48 |

| Range Site & MLRA | EE | | | | | PA | | | | | NA/FE* | | | | | LA | | | | | PCL/ESR | | | | | NG** | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | AMP Allotments | | Non-AMP Allotments | | All Allotments | | | | | | | | | | | | | | | |
| | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment (ac-ft/Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) | Total PSIAC Rating | Sediment Yield Class | Sediment Yield (ac-ft/sq mi/yr) | Sq mi | Total Annual Sediment Yield (ac-ft) |
| Sandy | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 52 | 3 | .53 | 19.0 | 10.07 | 44 | 4 | .38 | 19.0 | 7.22 | .38 | 11.7 | .53 | 7.3 | 8.32 | 46 | 4 | .42 | 19.0 | 7.98 | 43 | 4 | .37 | 19.0 | 7.03 | 33 | 4 | .26 | 8.2 | 2.13 |
| WP-3 | 53 | 3 | .55 | 6.8 | 3.74 | 45 | 4 | .40 | 6.8 | 2.72 | .40 | 1.6 | .55 | 5.2 | 3.50 | 47 | 4 | .44 | 6.8 | 2.99 | 44 | 4 | .38 | 6.8 | 2.58 | 35 | 4 | .28 | 1.9 | 0.53 |
| SO | 40 | 4 | .34 | 214.7 | 73.00 | 31 | 4 | .24 | 214.7 | 51.53 | .24 | 47.9 | .34 | 166.8 | 68.21 | 34 | 4 | .27 | 214.7 | 57.97 | 30 | 4 | .22 | 214.7 | 47.23 | 22 | 5 | .17 | 167.1 | 28.41 |
| CP | 43 | 4 | .37 | 47.1 | 17.43 | 33 | 4 | .26 | 47.1 | 12.25 | .26 | 0.0 | .37 | 47.1 | 17.43 | 36 | 4 | .29 | 47.1 | 13.66 | 32 | 4 | .25 | 47.1 | 11.78 | 23 | 5 | .18 | 34.7 | 6.25 |
| Shallow | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| WP-2 | 55 | 3 | .58 | 2.9 | 1.68 | 47 | 4 | .44 | 2.9 | 1.28 | .44 | 0.0 | .58 | 2.9 | 1.68 | 49 | 4 | .48 | 2.9 | 1.39 | 45 | 4 | .40 | 2.9 | 1.16 | 36 | 4 | .29 | 0.7 | 0.20 |
| WP-3 | 54 | 3 | .56 | 40.7 | 22.79 | 46 | 4 | .42 | 40.7 | 17.09 | .42 | 11.1 | .56 | 29.6 | 21.24 | 47 | 4 | .44 | 40.7 | 17.91 | 44 | 4 | .38 | 40.7 | 15.47 | 36 | 4 | .29 | 30.3 | 8.79 |
| CP | 53 | 3 | .55 | 33.5 | 18.43 | 45 | 4 | .40 | 33.5 | 13.40 | .40 | 0.0 | .55 | 33.5 | 18.43 | 47 | 4 | .44 | 33.5 | 14.74 | 43 | 4 | .37 | 33.5 | 12.40 | 36 | 4 | .29 | 21.6 | 6.26 |
| Shallow Sandstone WP-2 | 61 | 3 | .73 | 25.7 | 18.76 | 54 | 3 | .56 | 25.7 | 14.39 | .56 | 9.1 | .73 | 16.6 | 17.22 | 55 | 3 | .58 | 25.7 | 14.91 | 52 | 3 | .53 | 25.7 | 13.62 | 43 | 4 | .37 | 10.4 | 3.85 |
| Shallow Sandy SD | 40 | 4 | .34 | 1.4 | 0.48 | 32 | 4 | .25 | 1.4 | 0.35 | .25 | 0.0 | .34 | 1.4 | 0.48 | 34 | 4 | .27 | 1.4 | 0.38 | 31 | 4 | .24 | 1.4 | 0.34 | 21 | 5 | .16 | 1.3 | 0.21 |
| Total | | | | 1,915.3 | 1,367.07 | | | | 1,915.3 | 1,021.23 | | 532.5 | | 1,382.8 | 1,271.24 | | | | 1,915.3 | 1,090.89 | | | | 1,915.3 | 953.64 | | | | 1,241.9 | 477.57 |
| Range sites without sediment yield values | | | | 20.6 | | | | | 20.6 | | | 7.8 | | 12.8 | | | | | 20.6 | | | | | 20.6 | | | | | 11.4 | |
| Range sites with sediment yield values | | | | 1,894.7 | | | | | 1,894.7 | | | 524.7 | | 1,370.0 | | | | | 1,894.7 | | | | | 1,894.7 | | | | | 1,230.5 | |
| Mean sediment yield | | | .72 | | | | | .54 | | | | | | | | | | .58 | | | | | .50 | | | | | .39 | | |
| Mean sediment yield x total ES area | | | | | 1,482.91 | | | | | 1,112.18 | | (Mean sediment yield for AMP and non-AMP allotments = .67 ac-ft/sq mi/yr) | | | 1,379.93 | | | | | | | | | | | | | | | |

(2,059.6 sq mi) = total sediment yield for the ES area

144.3 sq mi could not be placed in a range site.

Sediment Yield Classes

2 - critical - 1.0 - 3.0 ac-ft/sq mi/yr
3 - moderate - 0.5 - 1.0 ac-ft/sq mi/yr
4 - slight - 0.2 - 0.5 ac-ft/sq mi/yr
5 - stable - less than 0.2 ac-ft/sq mi/yr

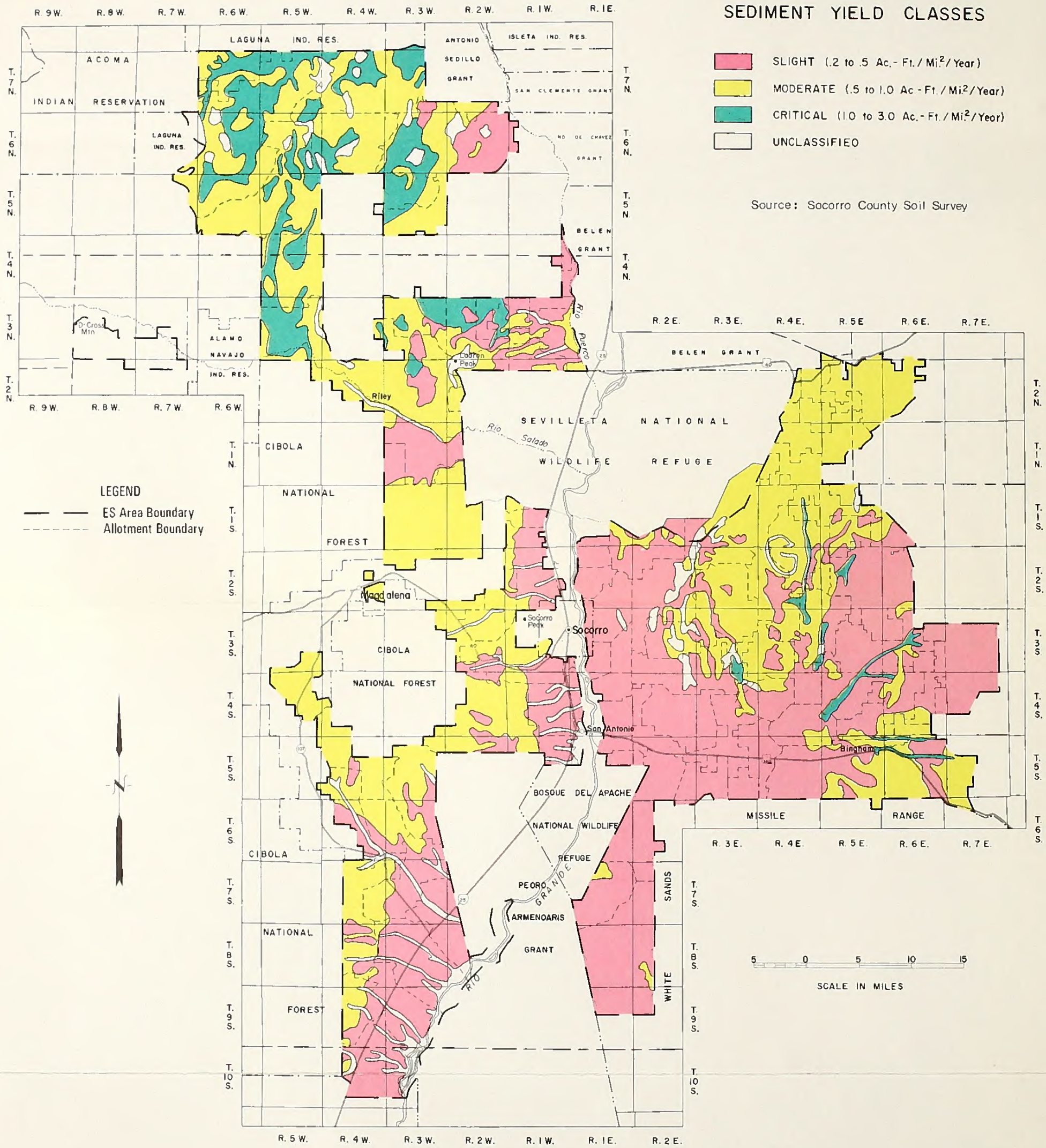
PSIAC Rating is explained in Appendix 3

*Sediment yield classes and total PSIAC rating for AMP allotments are the same as PA; for non-AMP and remaining allotments they are the same as the EE.

**The NG Alternative applies to public lands only.

Source: Socorro County Soil Survey and PSIAC Method

EE - Existing Environment
NA/FE - No Action Alternative and Future Environment
PA - Proposed Action
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative




MAP 2-4. Sediment Yield Classes

SD, and deep sand-SD range sites have the lowest sediment yields. The range in sediment yield of these soils is from 0.2 to 0.5 acre-feet per square mile per year (slight class). Soils in the hills-CP and gypsum hills-CP range sites have the highest sediment yields; they range from 1.0 to 3.0 acre-feet per square mile per year (critical class). Table 2-9 presents sediment yields for all the range sites. Table 2-10 presents the sediment yield classes. Sediment yield classes in the ES Area range from 12.4 percent in the critical class, to 41.8 percent in the moderate class, to 37.8 percent in the slight class; 8.0 percent could not be put in a class. None of the range site soil groupings are presently in the severe or stable classes. Individual soils may be in a different sediment yield class than the range site soil group they are placed in because these groups are only the average of all the soils. See Map 2-4 for present sediment yield classes.

### WIND EROSION

Wind erosion can only be discussed as the susceptibility to soil blowing as described by the wind erodibility group (WEG). WEGs establish a range of 'I' values (soil erodibility index) which are used in the 'Wind Erosion Equation,' E = f(IKCLV), to predict soil loss in tons per acre per year (SCS, 1975).

The properties which most influence the soil's susceptibility to blowing are the texture of the surface inch, presence of carbonates, percent coarse fragments, and moisture content of the soil. The groups range from 1 (very high soil blowing hazard) to 8 (slight soil blowing hazard). Appendix 3, p. A-72 discusses how the soils are placed in various WEGs. Column K of Table 2-8 displays WEGs for the soils in the ES Area.

Soils in the deep sand and sandy range sites are most susceptible to wind erosion hazard. Soils in the basalt hills, gravelly hills, limestone hills, and malpais range sites are least susceptible to wind erosion.

### *Future Environment*

Developments which require excavation would disturb soil on 31 acres in the short term and 19 acres in the long term. Developments which do not require excavation would disturb 60 acres in the short term and 48 acres in the long term. Infiltration and water retention would decrease on these disturbed areas.

Total sediment yield in the Future Environment would be reduced approximately 7 percent from existing levels of 1,410 to 1,555 acre-feet per year to 1,310 to 1,450 acre-feet per year. Soils on the 25 existing AMP allotments would have an average annual sediment yield of .54 acre- feet per square mile per year. On non-AMP allotments the average annual sediment yield would remain at .72 acre-feet per square mile per year.

### *Impacts*

### SOIL DISTURBANCES

Areas exposed during construction of range developments would be subjected to a local increase in soil erosion by wind and water. Removal of vegetation exposes the soil directly to the impact of falling rain which destroys the soil aggregates. As a result, the soil structure deteriorates and makes the soil more conducive to erosion.

Developments which do not require excavation, such as troughs, wildlife waters, and fences, would affect small areas during construction. These developments would disturb the soil mostly by compaction. Developments which require excavation, such as pipelines, cattleguards, springs, wells, storage tanks, and earthen reservoirs, would disturb the soil more than the other developments. Vegetation and topsoil would be moved and compacted by this type of construction. Concentrations of livestock around new troughs would create new sacrifice areas and cause increased surface disturbance, because vegetation is depleted and soil is compacted. The acreages disturbed for the Proposed Action and each alternative are shown in Table 1-4.

**Proposed Action** - Developments which require excavation would disturb 164 acres in the short term and 96 acres in the long term. Developments which do not require excavation would disturb 417 acres in the short term and 243 acres in the long term.

**No Action Alternative** - Developments which require excavation would disturb soil on 31 acres in the short term and 19 acres in the long term. Developments which do not require excavation would disturb 60 acres in the short term and 48 acres in the long term.

**Livestock Adjustment Alternative** - Developments which require excavation would disturb soil on 31 acres in the short term and 19 acres in the long term. Developments which do not require excavation would disturb 60 acres in the short term and 48 acres in the long term.

**Pasture Capacity Level Alternative** - Developments which require excavation would disturb soil on 164 acres in the short term and 96 acres in the long term. Developments which do not require excavation would disturb 417 acres in the short term and 243 acres in the long term.

**Enhancement of Sensitive Resource Values Alternative** - Developments which require excavation would disturb soil on 164 acres in the short

TABLE 2-10

COMPARISON OF SEDIMENT YIELD CLASSES

| | EE | PA | NA/FE | LA | PCL/ESR | NG* |
|---|---|---|---|---|---|---|
| % of ES Area by Range Site in Stable Class 0-.2 ac.-ft./mi.sq./yr. | 0 | 0 | 0 | 0 | 0 | 13.1 |
| % of ES Area by Range Site in Slight Class .2-.5 ac.-ft./mi.sq./yr. | 37.8 | 63.9 | 38.8 | 54.3 | 63.9 | 39.8 |
| % of ES Area by Range Site in Moderate Class .5- 1.0 ac.-ft./mi.sq./yr. | 41.8 | 21.0 | 44.6 | 30.6 | 21.0 | 2.1 |
| % of ES Area by Range Site in Critical Class 1.0-3.0 ac.-ft./mi.sq./yr. | 12.4 | 7.1 | 8.6 | 7.1 | 7.1 | 4.8 |
| Unclassified | 8.0 | 8.0 | 8.0 | 8.0 | 8.0 | 40.2 |
| TOTAL | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

EE - EXISTING ENVIRONMENT
NA/FE - NO ACTION ALTERNATIVE AND FUTURE ENVIRONMENT
PA - PROPOSED ACTION
LA - LIVESTOCK ADJUSTMENT ALTERNATIVE
PCL - PASTURE CAPACITY LEVEL ALTERNATIVE
ESR - ENHANCEMENT OF SENSITIVE RESOURCE VALUES ALTERNATIVE
NG - NO GRAZING ALTERNATIVE

* Only public land is considered, so a large portion of the ES Area would be unclassified.

Source: Table 2-9

term and 96 acres in the long term. Developments which do not require excavation would disturb 443 acres in the short term and 248 acres in the long term.

**No Grazing Alternative** - A total of 1,475 acres in the short term and 295 acres in the long term would be disturbed by the construction of 1,475 miles of fences.

## INFILTRATION AND WATER RETENTION

Construction of range developments would result in decreased infiltration and water retention in affected soils. There would be a greater disturbance of soils in the loamy and bottomland range sites, because they compact more readily. Construction of developments would decrease water retention and infiltration because of soil compaction and disturbance or removal of vegetation and roots. As a result, less water would be intercepted, and more would run off the soil surface. New sacrifice areas around new water developments would be created. In these areas trampling and heavy utilization would cause a decrease in infiltration and water retention. Overall decreases in infiltration and water retention would be local, small, and unmeasurable.

Through improved livestock management and reduced utilization, vegetative density and cover would increase. This would increase the soil's infiltration and water retention. Increased cover would decrease the sealing of the soil due to raindrop impact and would increase infiltration. More precipitation would be intercepted because of the increased vegetative cover. Increased root density would improve available water holding capacity by increasing infiltration. Table 2-14 in the Water Resources Section presents infiltration rates for the Proposed Action and alternatives. Data is not available to quantify the increases in water retention. Qualitative change is directly related to percent change in density and cover. Table A-20 (Appendix 3, p. A-75) displays changes in cover by range sites. This is a long-term, area-wide impact.

**Proposed Action** - Construction would decrease infiltration and water retention on 580 acres in the short term and 339 acres in the long term.

Vegetative density and cover would increase 2.7 percent overall, in the long term; this would increase infiltration and water retention. Range sites with the greatest increases in cover would have the greatest increases in infiltration and water retention. Loamy WP-2 and CP, sandy CP, malpais WP-2, and bottomland WP-2 and CP would have the greatest increases in cover, 7 to 10 percent (Appendix 3, Table A-20, p. A-75).

**No Action Alternative** - Construction would decrease infiltration and water retention on 90 acres in the short term and 67 acres in the long term.

Increases in vegetative cover and density would not be as much as for the Proposed Action. Only the 25 existing AMP allotments would have increases in density and cover with an average increase of 2.7 percent from the existing 34.1 percent to 36.8 percent. On AMP allotments density and cover would increase on 24 range sites. Infiltration and water retention would increase as the density and cover increases. On non-AMP allotments there would not be any increase in vegetative density and cover; and, therefore, no increase in infiltration or water retention because grazing systems would not be implemented and utilization would not be reduced on these allotments.

**Livestock Adjustment Alternative** - Construction would decrease infiltration and water retention on 90 acres in the short term and 67 acres in the long term. Through improved livestock management and decreased utilization, vegetative density and cover would increase. Fifteen of the 38 range sites would show no increase in cover and would not be expected to increase their water retention. Twenty-three (23) of the range sites would show increases in cover; but in most cases, it would only be 1 to 3 percent (Appendix 3, Table A-20, p. A-75). Soils in these range sites would be expected to increase their water retention slightly.

**Pasture Capacity Level Alternative** - Construction would decrease infiltration and water retention on 580 acres in the short term and 339 acres in the long term. Increases in cover range from 1 to 12 percent and average 5.8 percent. Cover would increase on all range sites with this alternative, so infiltration and water retention would increase on these soils more than with the Proposed Action.

**Enhancement of Sensitive Resource Values Alternative** - Construction would decrease infiltration and water retention on 607 acres in the short term and 344 acres in the long term. For the total area infiltration and water retention would increase because increases in cover would be the same (ranging from 1 to 12 percent and averaging 5.8 percent) as for the Pasture Capacity Level Alternative (Appendix 3, Table A-20, p. A-75).

**No Grazing Alternative** - Construction of 1,475 miles of fences would decrease infiltration and water retention on 1,475 acres in the short term and 295 acres in the long term.

The elimination of grazing on public land would increase vegetative density and cover by 1 to 9 percent (average 4.4 percent). All the range sites would have increases in vegetative density and cover on public land. On private and State lands vegetative density and cover are not expected to

change, so infiltration and water retention would not change.

## WATER EROSION

The construction of range developments and access roads would increase soil erosion in affected areas. Increases in surface runoff would occur where vegetation is removed and the soil surface is disturbed. This would produce conditions conducive to sheet and rill erosion. Where slopes are unstable, gully formation would also increase. Developments which require excavation (pipelines, cattleguards, springs, wells, and earthen reservoirs) would disturb the soil more than those which do not, because vegetation and topsoil would be moved and compacted. Also, in areas of critically eroded soils, erosion may increase greatly. These areas are scattered throughout a larger area so the long-term, area-wide impact would be small.

Increased vegetative density and cover resulting from implementation of grazing systems and reductions in utilization would decrease soil erosion in the ES Area. Increased cover would provide more protection from raindrop impact, and increased density would disrupt erosive surface runoff. Increased root density would also help hold the soil in place. The magnitude of this impact is difficult to quantify. Table 2-9 summarizes the anticipated changes in sediment yield for the range site soil groups described in Table 2-8. Table 2-10 presents a comparison of the sediment yield classes by range site for the Existing Environment, the Proposed Action, and alternatives. Changes in sediment yield were estimated with the PSIAC method (1968) described in Appendix 3, p. A-73, and were based on predicted changes in runoff (precipitation intensity) calculated in the Water Resources Section, vegetative cover calculated in the Vegetation Section, soil surface factors (SSFs), and land use (i.e., forage utilization as described in the AMPs). A complete discussion of the assumptions used in calculating future sediment yields is presented in Appendix 3, p. A-74. Most soils would show decreased sediment yields compared to present conditions. This is a long-term, area-wide impact.

**Proposed Action** - Construction which requires excavation would increase water erosion susceptibility on 164 acres in the short term and 96 acres in the long term. Construction which does not require excavation would impact 417 acres in the short term and 243 acres in the long term.

For the total area sediment yields would decrease 26 percent from the existing 1,410 to 1,555 acre-feet per year to 1,055 to 1,170 acre-feet per year in the long term. The average annual sediment yield per square mile would be .54 acre-feet. The most significant decrease in sediment yield would occur on bottomland WP-2 and CP, with a 35-to 37-percent decrease from the present average annual yield of 1.0 to 1.5 acre-feet per square mile. The decrease in sediment yield is due to a 10-percent increase in vegetative cover on these range sites and an improved SSF condition (average is presently 46 for CP and 78 for WP-2; with the Proposed Action it would be 37 for CP and 63 for WP-2) (Appendix 3, PSIAC Method, Factor 8, p. A-73). Changes in runoff (precipitation intensity) and land use would not vary significantly between range sites. Soils in range sites where cover is not expected to increase would show the smallest decrease in sediment yield. Soils in the basalt hills WP-3, limestone hills WP-2, and malpais CP range sites would show the smallest decrease in sediment yield (19-percent average decrease from present sediment yields of .6 acre-feet per square mile per year, Table 2-11).

Presently, 12.4 percent of the soils in the ES Area are in the critical sediment yield class, 41.8 percent in the moderate class, and 37.8 percent in the slight class. For the Proposed Action 7.1 percent of the ES Area would be in the critical class, 21.0 percent in the moderate class, and 63.9 percent in the slight class.

**No Action Alternative** - Developments which require excavation would increase water erosion susceptibility on 31 acres in the short term and 19 acres in the long term. Developments which do not require excavation would impact 60 acres in the short term and 48 acres in the long term.

In the long term sediment yields would be reduced 7 percent or 1,310 to 1,450 acre-feet per year from the existing 1,410 to 1,555 acre-feet per year. This is an average annual sediment yield of .67 acre-feet per square mile. This reduction in sediment yield is not as much as the Proposed Action (26 percent), because changes in cover, runoff, and SSFs are not as great. Soils on the 25 existing AMP allotments would have the same sediment yield as the Proposed Action, .54 acre-feet per square mile per year. On non-AMP allotments there would not be any reduction in sediment yield from the present, because grazing systems would not be implemented and utilization would not be reduced on these allotments. Average annual sediment yield would be .72 acre-feet per square mile. Total sediment yield by range site is presented in Table 2-9. Range site soil groups would have a large percentage of their area on the 25 existing AMP allotments which have lower sediment yields than those on non-AMP allotments.

**Livestock Adjustment Alternative** - Developments which require excavation would increase water erosion susceptibility on 31 acres in the

TABLE 2-11

PERCENT SEDIMENT YIELD REDUCTION BY RANGE SITES IN THE LONG TERM

| Range Site and MLRA | | EE Sediment Yield Ac-Ft/Mi Sq/Yr | NA/FE* % | PA % | LA % | PCL/ESR % | NG** % |
|---|---|---|---|---|---|---|---|
| Basalt Hills | WP-3 | .55 | 0 | 20 | 18 | 24 | 45 |
| Bottomland | WP-2 | 1.30 | 17 | 35 | 25 | 35 | 54 |
| | WP-3 | 1.50 | 15 | 23 | 20 | 28 | 50 |
| | SO | .42 | 10 | 26 | 19 | 29 | 50 |
| | CP | 1.15 | 0 | 37 | 26 | 39 | 54 |
| Deep Sand | SO | .35 | 3 | 26 | 20 | 29 | 49 |
| Gravelly | WP-3 | .44 | 14 | 30 | 23 | 34 | 55 |
| | SD | .40 | 10 | 23 | 18 | 28 | 50 |
| | CP | .38 | 18 | 24 | 18 | 29 | 50 |
| Gypsum | SO | .70 | 0 | 24 | 20 | 26 | 50 |
| | CP | .70 | 3 | 26 | 20 | 29 | 49 |
| Gypsum Hills | CP | 2.05 | 8 | 27 | 22 | 29 | 51 |
| Hills | WP-3 | .79 | 1 | 29 | 24 | 30 | 52 |
| | CP | 2.90 | 7 | 21 | 17 | 28 | 29 |
| Limestone Hills | WP-2 | .60 | 5 | 20 | 17 | 27 | 48 |
| | WP-3 | .52 | 0 | 27 | 23 | 33 | 50 |
| | SD | .45 | 7 | 24 | 20 | 31 | 53 |
| | CP | .55 | 5 | 27 | 27 | 33 | 49 |
| Loamy | WP-2 | 1.00 | 12 | 25 | 21 | 30 | 45 |
| | WP-3 | .73 | 3 | 29 | 21 | 32 | 52 |
| | SO | .58 | 10 | 28 | 22 | 31 | 50 |
| | CP | .58 | 3 | 24 | 22 | 31 | 48 |
| Malpais | WP-2 | .68 | 15 | 29 | 22 | 35 | 50 |
| | WP-3 | .45 | 0 | 22 | 20 | 27 | 51 |
| | SD | .29 | 0 | 28 | 24 | 31 | 52 |
| | CP | .65 | 0 | 18 | 15 | 23 | 46 |
| Sandstone Hills | WP-2 | .60 | 8 | 25 | 17 | 30 | 48 |
| Sandy | WP-2 | .53 | 17 | 28 | 21 | 30 | 51 |
| | WP-3 | .55 | 7 | 27 | 20 | 31 | 49 |
| | SO | .34 | 6 | 29 | 21 | 35 | 50 |
| | CP | .37 | 0 | 30 | 22 | 32 | 51 |
| Shallow | WP-2 | .58 | 0 | 24 | 17 | 31 | 50 |
| | WP-3 | .56 | 7 | 25 | 21 | 32 | 48 |
| | CP | .55 | 0 | 27 | 20 | 33 | 47 |
| Shallow Sandstone | WP-2 | .73 | 8 | 23 | 21 | 27 | 49 |
| Shallow Sandy | SO | .34 | 0 | 26 | 21 | 29 | 53 |
| Total ES Area | | .72 | 7 | 26 | 19 | 31 | 46 |

EE - Existing Environment
NA/FE - No Action Alternative and Future Environment
PA - Proposed Action
LA - Livestock Adjustment Alternative
PCL/ESR - Pasture Capacity Level and Enhancement of Sensitive Resource Values Alternatives
NG - No Grazing Alternative

* Represents the average for each range site for AMP, non-AMP, and remaining allotments. For 25 existing AMPs, reductions would be the same as PA. For non-AMPs and remaining allotments sediment yields would be same as EE.
**On public land

Source: Table 2-9

short term and 19 acres in the long term. Developments which do not require excavation would impact 60 acres in the short term and 48 acres in the long term.

In the long term sediment yields would be reduced 19 percent from the existing 1,410 to 1,555 acre-feet per year to 1,135 to 1,255 acre-feet per year. The average annual sediment yield would be .58 acre-feet per square mile. This reduction in sediment yield is not as much as the Proposed Action (26 percent), because changes in cover, runoff, and SSFs are not as great. Soils in the bottomland WP-2 and CP, hills WP-3, limestone hills CP, and malpais SD range sites would reduce their sediment yields the most, averaging 25 percent (Table 2-11). Soils in the hills CP, limestone hills WP-2, sandstone hills WP-2, and shallow WP-2 range sites would have the smallest reductions in sediment yield, averaging 17 percent.

**Pasture Capacity Level Alternative** - Developments which require excavation would increase water erosion susceptibility on 164 acres in the short term and 96 acres in the long term. Developments which do not require excavation would impact 417 acres in the short term and 243 acres in the long term.

Sediment yields would be reduced 31 percent from the existing 1,410 to 1,555 acre-feet per year to 980 to 1,080 acre-feet per year. This represents an average annual sediment yield of .50 acre-feet per square mile. This reduction is due to an average 6-percent increase in cover, 31-percent decrease in land use, decrease in runoff (precipitation intensity), and improved SSFs. Soils in the bottomland CP range site would have the greatest decrease in sediment yield, 39 percent. Soils in the malpais CP range site would have the least reduction in sediment yield, 23 percent.

**Enhancement of Sensitive Resource Values Alternative** - Developments which require excavation would increase water erosion susceptibility on 164 acres in the short term and 96 acres in the long term. Developments which do not require excavation would impact 443 acres in the short term and 248 acres in the long term.

Sediment yields would be reduced 31 percent from the existing 1,410 to 1,555 acre-feet per year to 980 to 1,080 acre-feet per year. This represents an average annual sediment yield of .50 acre-feet per square mile. This reduction is due to an average 6-percent increase in cover, 31-percent decrease in land use, decrease in runoff (precipitation intensity), and improved SSFs. Soils in the bottomland CP range site would have the greatest reduction in sediment yield, 39 percent. Soils in the malpais CP range site would have the smallest decrease in sediment yield, 23 percent.

**No Grazing Alternative** - A total of 1,475 acres in the short term and 295 acres in the long term would be impacted by the construction of 1,475 miles of fences. Area-wide increases in sediment yield would be small and unmeasurable when considered within the entire ES Area.

Under this alternative sediment yields would decrease the most, 46 percent, on public lands. Existing sediment yields of 1,410 to 1,555 acre-feet per year on 2,060 square miles would be reduced to 455 to 500 acre-feet per year on 1,231 square miles. The average sediment yield for the Existing Environment is .72 acre-feet per square mile per year. For the No Grazing Alternative it would be .39 acre-feet per square mile per year on public land only. Percent cover would increase an average of 4.4 percent by range site; land use would decrease by 70 percent on public lands; and runoff (precipitation intensity) and SSFs would be reduced in the long term. Soils in the bottomland WP-2 and CP and gravelly WP-3 range sites would have the greatest decreases in sediment yield, 54 to 55 percent. Soils in the hills CP range site would have the smallest decrease in sediment yield, 29 percent. On State and private lands runoff, utilization, SSFs, and vegetative density and cover would not change, so the sediment yield would be the same as present, 1,410 to 1,555 acre-feet per year.

## WIND EROSION

The construction of range developments would increase the susceptibility of affected soils to erosion from blowing wind. Removal of vegetation during construction would expose more soil surface to strong winds. Soil structure would break down, thus increasing the soil's susceptibility to wind erosion. Soils in WEGs 1 and 2 (soils with sandy surfaces) would be most susceptible to increased wind erosion due to the disturbance or removal of vegetation (Table 2-8, Column K).

Increased vegetative density and cover (Appendix 3, Table A-20, p. A-75) resulting from improved grazing management should decrease wind erosion of soils. Increased vegetative cover would protect the soil from blowing wind. Increased root density would help hold the soil in place. Quantitative data is not available; qualitative data is inversely related to increased vegetative density and cover. This would be a long-term, area-wide impact.

**Proposed Action** - Construction would increase wind erosion susceptibility on 580 acres in the short term and 339 acres in the long term. Wind erosion susceptibility for the total area would decrease because of increases in vegetative density and cover. Existing cover averages 34.1 percent by range site. With the implementation of the

Proposed Action it would average 36.8 percent, a 2.7-percent increase (Appendix 3, Table A-20, p. A-75). This would decrease the susceptibility of soils to wind erosion.

**No Action Alternative** - Construction would increase wind erosion susceptibility on 90 acres in the short term and 67 acres in the long term. Cover would increase (from the existing average of 34.1 percent) an average of 2.7 percent by range site on the 25 existing AMP allotments. The increase in vegetative density and cover would decrease the susceptibility of soils to wind erosion. On non-AMP allotments there would not be any increase in vegetative density and cover; and, therefore, no decrease in wind erosion susceptibility because grazing systems would not be implemented and utilization would not be reduced on these allotments.

**Livestock Adjustment Alternative** - Construction would increase wind erosion susceptibility on 90 acres in the short term and 67 acres in the long term. Wind erosion susceptibility for the total area would decrease because vegetative density and cover would increase (from the existing average of 34.1 percent) an average of 2 percent for each range site. The increased cover would decrease the susceptibility of soils to wind erosion an unmeasurable amount.

**Pasture Capacity Level Alternative** - Construction would increase wind erosion susceptibility on 580 acres in the short term and 339 acres in the long term. Wind erosion susceptibility for the total area would decrease, because cover would increase (from the existing average of 34.1 percent) an average of 5.8 percent for each range site (Appendix 3, Table A-20, p. A-75).

**Enhancement of Sensitive Resource Values Alternative** - Construction would increase wind erosion susceptibility on 607 acres in the short term and 344 acres in the long term. Wind erosion susceptibility for the total area would decrease because of increases in vegetative density and cover. The long-term increase in cover would be the same as the Pasture Capacity Level Alternative, 5.8 percent. In the short term livestock grazing would be eliminated from an additional 184,802 acres which have 30 percent or more of the pasture in poor range condition and/or critical or severe erosion condition. An additional 360 acres of deep sand soils (the most susceptible to wind erosion) in poor range condition would also not be grazed under this alternative. Wind erosion susceptibility would significantly decrease on these rested areas. Grazing would be allowed on individual pastures as range or watershed conditions improve.

**No Grazing Alternative** - The construction of 1,475 miles of fences would increase wind erosion susceptibility on 1,475 acres in the short term and 295 acres in the long term where vegetation would be disturbed, exposing more surface soil to winds. Vegetative density and cover would increase (from the existing average of 34.1 percent) an average of 4.4 percent in the long term on public lands (Appendix 3, Table A-20, p. A-75). Increased cover would decrease the soil's susceptibility to wind erosion an unmeasurable amount. On State and private lands density and cover are not expected to change, so wind erosion susceptibility would not change.

## CUMULATIVE IMPACTS

**Proposed Action** - Sediment yield would be reduced approximately 26 percent with the Proposed Action from a range of 1,410 to 1,555 acre-feet per year to 1,055 to 1,170 acre-feet per year, an average of .54 acre-feet per square mile per year. The reduction in sediment yield would be due to an increase in vegetative density and cover, a reduction in runoff and land use, and improved SSF condition.

**No Action Alternative** - Sediment yield would be reduced approximately 7 percent from the existing range of 1,410 to 1,555 acre-feet per year to 1,310 to 1,450 acre-feet per year, an average of .67 acre-feet per square mile per year.

**Livestock Adjustment Alternative** - Sediment yield would be reduced approximately 19 percent from the existing range of 1,410 to 1,555 acre-feet per year to 1,135 to 1,255 acre-feet per year, an average of .58 acre-feet per square mile per year.

**Pasture Capacity Level Alternative** - Sediment yield would be reduced approximately 31 percent from the existing range of 1,410 to 1,555 acre-feet per year to 980 to 1,080 acre-feet per year, an average of .50 acre-feet per square mile per year.

**Enhancement of Sensitive Resource Values Alternative** - Sediment yield would be reduced approximately 31 percent from the existing range of 1,410 to 1,555 acre-feet per year to 980 to 1,080 acre-feet per year, an average of .50 acre-feet per square mile per year.

**No Grazing Alternative** - Sediment yield would be reduced approximately 46 percent on public land from the existing range of 1,410 to 1,555 acre-feet per year for the entire ES Area (2,060 square miles) to 455 to 500 acre-feet per year on 1,231 square miles of public land, an average of .39 acre-feet per square mile per year.

### *Irreversible and Irretrievable*

Topsoil that is displaced by erosion as a direct result of the Proposed Action is irretrievable. However, sediment yields with the Proposed Action are estimated to be reduced approximately 18 to

37 percent annually from the existing yields of 1,410 to 1,555 acre-feet per year (See Table 2-11).

## WATER RESOURCES

### *Existing Environment*

#### SURFACE WATER RESOURCES

The ES Area lies within four principal drainage areas: the Rio Salado watershed, the lower Rio Puerco watershed, the Jornada del Muerto closed basin, and areas draining directly into the Rio Grande. The area is in the arid and semiarid climatic zones, and surface water is relatively scarce.

The Rio Grande is the only perennial stream in the area. It enters about 15 miles south of Belen and continues southward through the center of the area until it reaches the Elephant Butte Marsh Area near the Sierra County line. Several tributaries, including the Rio Puerco and Rio Salado, enter the Rio Grande from the west as it travels through the area. Several small arroyos and dry washes enter the river from the east (New Mexico State Engineer's Office, 1974). Flow within almost all tributaries comes only in response to storm events. The main flow of the Rio Grande is completely controlled, and most flow is conveyed downstream in a series of irrigation canals. There are appreciable amounts of water in the main channel of the Rio Grande only in periods of high flow.

The Rio Puerco is the largest of the New Mexico tributaries to the Rio Grande with a watershed area of 7,340 square miles. From its clear, perennial headwaters in the Sierra Nacimiento and San Pedro Mountains, the Rio Puerco winds through the severely-eroded Colorado Plateau, picking up inordinately large amounts of sediment. By the time the Rio Puerco enters the area, it flows only intermittently and is one of the most sediment-laden streams in the Nation (U. S. Army Corps of Engineers, 1972). Approximately 850 square miles of the lower Rio Puerco basin lie in the area, and the only major tributaries to the river in this area are Arroyo Colorado and Arroyo Monte Largo.

The Rio Salado watershed adjoins the Rio Puerco watershed on the south and forms the other major tributary to the Rio Grande in the area. The stream rises on the eastern slope of the Datil Mountains and flows 86 miles eastward to its confluence with the Rio Grande near San Acacia, about 8 river miles downstream from the Rio Puerco confluence. The Rio Salado is an ephemeral stream through most of its length flowing only in response to storm events. Perennial flow does occur below a spring on allotment 121 (T. 1 N., R. 2 W., Sec. 7) and continues approximately 12 miles downstream to the Sevilleta Land Grant where it disappears into the channel bottom. The major tributaries in this basin of about 1,400 square miles are Alamocito Creek, Gallegos Creek, Canon Bonito, Jaralosa Canyon, Bear Springs Wash, and La Jencia Creek; all are ephemeral streams. The Rio Salado contributes large quantities of suspended sediment and bedload to the Rio Grande (U. S. Army Corps of Engineers, 1972).

The other major watershed is the Jornada del Muerto closed basin. This basin lies east of the Rio Grande, separated from the river by the low Fra Cristobal and Caballo Mountains. It covers an area of 3,475 square miles and receives ephemeral streamflow from the Sierra Oscura and San Andres Mountains to the east, as well as, the aforementioned mountains to the west. At the north and south ends of the Jornada del Muerto, the divides between the basin and the adjacent Rio Grande Valley are low and indistinct. Much of the area might contribute runoff were it not for the very scant precipitation and low gradients which allow runoff to sink into the ground or evaporate before flowing any great distance (New Mexico State Engineer's Office, 1967).

There is very little other surface water. The smaller stream courses contain only ephemeral flow, except for short reaches below springs and seeps. Perennial flow (in Ponia Creek, Arroyo Salado, Ojo Saladito, Arroyo Monte Largo, and Salt Spring in the Rio Puerco drainage, and Arroyo de las Canas in the Rio Grande drainage) is limited to reaches of 2 miles or less. There are no natural lakes or ponds, and earthen reservoirs designed to catch and store storm runoff are dry most of the year. All calculations in this section are based on two representative watersheds in each of these four principal drainage areas.

#### RUNOFF AND INFILTRATION

Runoff over the entire area averages 0.1 inches or less each year, except at higher elevations (e.g., Ladron Peak) where there may be as much as 0.5 inches annually. Summer thunderstorm activity generates the greatest percentage of the annual runoff. Analysis of monthly streamflow records indicates that 80 percent of the annual runoff comes in response to thunderstorms, with 18 percent of the annual runoff coming from cyclonic storms and only 2 percent coming from snowmelt (Kantz et al 1977).

Runoff generated from summer thunderstorms often occurs as brief periods of high flow in the ephemeral channels that drain most of the area. Where watershed conditions favor rapid runoff,

flash flooding is common. The magnitude of the flooding depends on the amount of precipitation received and various watershed characteristics, including drainage area, vegetative cover, and soil types. Streamflow data for these ephemeral channels is not available; therefore, flood estimates must be based on empirical relationships. Peak rates of runoff and peak flows for the ephemeral streams were calculated using the Soil Conservation Service's Unit Hydrograph approach (USDA-SCS, 1972). Selection of these representative watersheds was based on drainage area, amount of public lands subject to the Proposed Action, dominant vegetative type, and dominant hydrologic soil type. Map 2-5 depicts the location of these watersheds in the ES Area, and Table 2-12 summarizes the physical characteristics of each watershed. A complete analysis of the methods used in selecting watersheds and estimating flood peaks is presented in Appendix 4, p. A-78.

Streamflow also shows strong seasonal trends, with the Rio Puerco and Rio Salado experiencing 64 and 88 percent, respectively, of their total annual runoff in the summer months. Maximum discharge recorded for the Rio Puerco at Bernardo is 18,800 cfs while the maximum recorded flow for the Rio Salado at San Acacia is 36,200 cfs (USGS, 1975). Table 2-13 presents a comparison of runoff estimates for the Existing and Future Environments and the predicted impacts of the Proposed Action and alternatives.

Infiltration is the amount of moisture that is absorbed by soil. Infiltration is one of the major factors influenced by grazing which in turn affects runoff, flooding, and erosion. Improper grazing can cause a reduction in the amount of cover. This would make soil more susceptible to erosion and decrease infiltration, thereby increasing runoff. Proper grazing can produce increased infiltration rates. Infiltration rates are best described in terms of hydrologic soil groups.

All hydrologic soil groups in the ES Area indicate a high degree of variability in infiltration rates. Table 2-8 in the Soils Section gives the hydrologic group for each of the soil units mapped. Gifford, Hawkins, and Williams (1975) have estimated infiltration rates for the various hydrologic soil groups and have attempted to relate infiltration rates to differences in grazing pressure. Under heavy grazing pressure (defined here as 60- to 80-percent forage utilization), infiltration rates are markedly reduced from infiltration on ungrazed areas. This is true for three of the four hydrologic soil groups; Group D is the exception. Grazing pressure is heavy in most of the area, and infiltration rates should approximate those predicted with the equation developed by Gifford, Hawkins, and Williams (1975). Table 2-14 compares the infiltration rates for the Existing and Future Environments and the predicted impacts of the Proposed Action and alternatives.

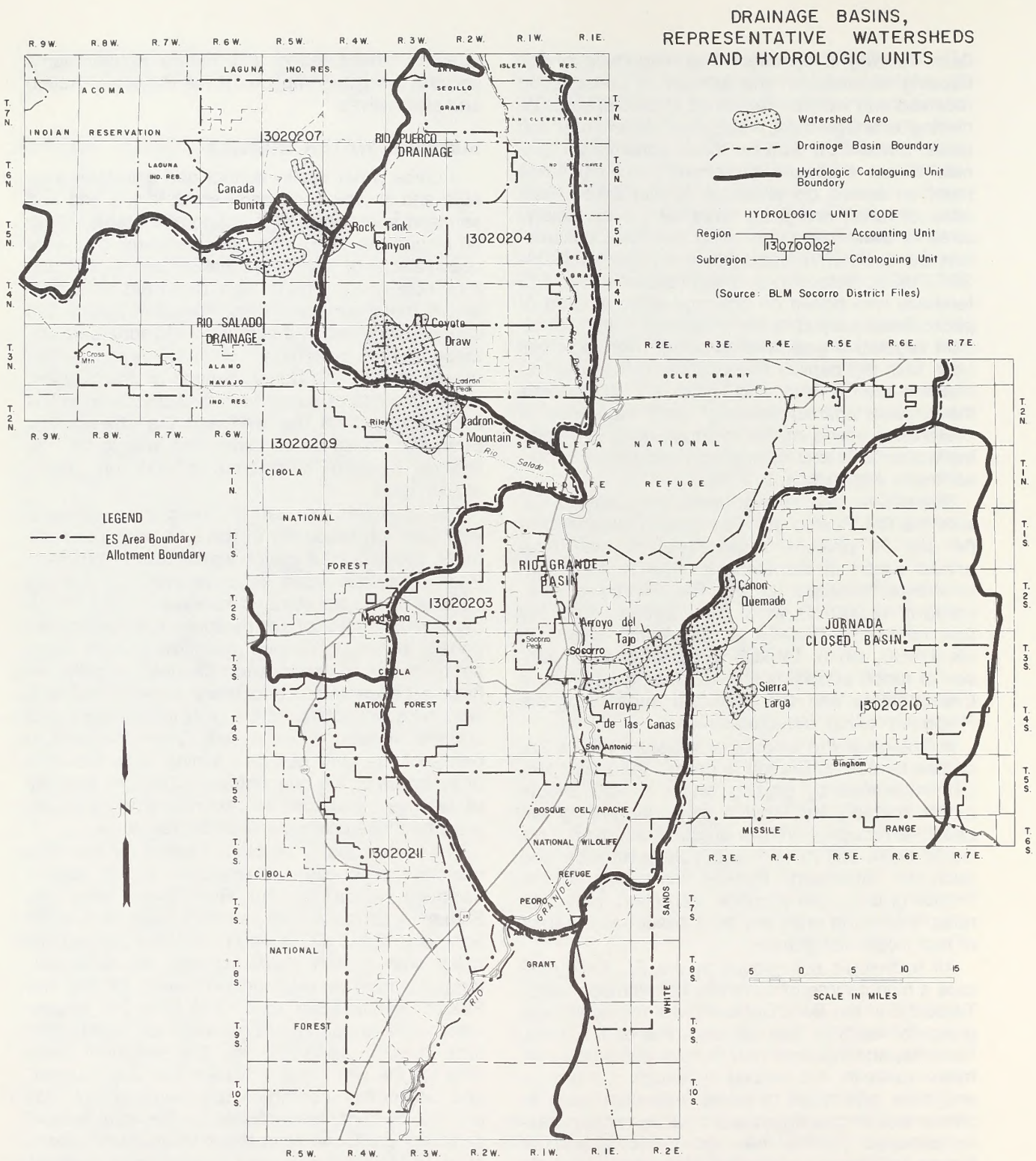
## SURFACE WATER QUALITY

Surface water quality is poor and extremely variable and is typical of many areas in the arid and semiarid southwest. High evaporation rates (50 to 70 inches per year), extensive seepage, and wide occurrences of readily leachable salts in soil and rock combine to create high, dissolved solid content in many surface waters. Prevalent anions and cations dissolved in these waters include calcium, magnesium, carbonate, chloride, and sulfate (Kantz et al 1977). During periods of precipitation, large amounts of suspended and dissolved solids are leached from the land and the streambeds. Eventually these solids make their way to the Rio Grande causing detrimental effects on downstream uses.

The intense summer thunderstorms combine with the high erodibility of the soils to make sediment production a major water quality problem. Poor vegetative cover exposes much of the soil surface to the full force of raindrop impact resulting in detachment of soil particles. Poor vegetative density allows unimpeded sheetflow to carry these soil particles to the nearest channel or gully. As flow is concentrated into these steep-walled gullies, the susceptibility of the gully to headward and channel erosion is increased. Often the vertical banks of the gully collapse adding large amounts of sediment to the concentrated flow. The quantity of sediment that can be removed from a watershed by these processes can be very large.

The water quality problem created by the high sediment production is reflected in the annual sediment yields for the Rio Puerco and Rio Salado. Average annual sediment yield for the Rio Salado is 2,147,627 tons (1,556 tons per square mile), with annual yields as high as 4,645,461 tons. Average annual sediment yield for the Rio Puerco is 6,037,521 tons (413 tons per square mile), with annual yields as high as 18,315,560 tons (USGS, 1948-75). Monthly sediment yield data for the two rivers indicates that July, August, and September contribute approximately 17, 45, and 20 percent, respectively, of the total annual sediment produced from these watersheds (Kantz et al 1977); thus, sediment production is greatest during the period of intense thunderstorm activity.

In the stretch of the Rio Grande downstream from Albuquerque, higher than desirable concentrations of iron, manganese, nitrogen compounds, phosphorus compounds, and coliform bacteria have been recorded (New Mexico Water Quality Commission, 1975).




**MAP 2-5.** Drainage Basins, Representative Watersheds and Hydrologic Units

TABLE 2-12

PHYSICAL PARAMETERS OF REPRESENTATIVE WATERSHEDS

| | Jornada Closed Basin 30% of ES Area | | Rio Grande Tributaries 38% of ES Area | | Rio Puerco Drainage 17% of ES Area | | Rio Salado Drainage 15% of ES Area | |
|---|---|---|---|---|---|---|---|---|
| Parameters | Sierra Larga | Canon Quemado | Arroyo del Tajo | Arroyo de Las Canas | Rock Tank Canyon | Coyote Draw | Ladron Mountain | Canada Bonita |
| Outlet Location | T.4S.,R.3E., SE 14 | R.3S.,R.3E., NW 28 | T.3S.,R.1E., SE 17 | T.3S.,R.1E., SE 29 | T.6N.,R.5W., SW 13 | T.3N.,R.3W., NE 4 | T.2N.,R.3W., Sec. 33 | T.4N.,R.5W. SW 5 |
| Area (sq. miles) | 8.6 | 21.2 | 7.3 | 25.3 | 18.8 | 45.8 | 12.4 | 26.4 |
| Channel Gradient (Percent Slope) | 2.5 | 2.0 | 2.0 | 2.0 | 1.0 | 2.0 | 5.5 | 1.0 |
| Main Channel Length (miles) | 4.8 | 9.0 | 7.4 | 15.3 | 6.1 | 14.3 | 3.8 | 8.1 |
| Cumulative Channel Length (miles) | 14.4 | 66.7 | 22.9 | 52.3 | 19.4 | 43.5 | 17.1 | 51.9 |
| Elevation Gain in Channel (feet) | 600 | 1,460 | 800 | 1,100 | 400 | 800 | 2,240 | 1,300 |

Source: BLM Socorro District Files

TABLE 2-13

A COMPARISON OF RUNOFF ESTIMATES FOR REPRESENTATIVE WATERSHEDS
(All values are in cfs)

LONG-TERM VALUES



| | EE | PA | NA/FE | LA | PCL | ESR | NG /1 |
|---|---|---|---|---|---|---|---|
| Jornada Closed Basin | | | | | | | |
| Sierra Larga (Small) | | | | | | | |
| 2-Year Flood | 508 | 471 | 498 | 482 | 432 | 432 | 457 |
| 5-Year Flood | 1,078 | 1,020 | 1,061 | 1,037 | 958 | 958 | 997 |
| 10-Year Flood | 1,790 | 1,713 | 1,768 | 1,736 | 1,630 | 1,630 | 1,682 |
| 25-Year Flood | 2,615 | 2,519 | 2,588 | 2,547 | 2,416 | 2,416 | 2,481 |
| Canon Quemado (Large) | | | | | | | |
| 2-Year Flood | 272 | 256 | 266 | 261 | 177 | 177 | 149 |
| 5-Year Flood | 828 | 798 | 817 | 808 | 643 | 643 | 586 |
| 10-Year Flood | 1,621 | 1,577 | 1,605 | 1,591 | 1,345 | 1,345 | 1,258 |
| 25-Year Flood | 2,608 | 2,551 | 2,587 | 2,569 | 2,242 | 2,242 | 2,125 |
| Rio Grande Tributaries | | | | | | | |
| Arroyo Del Tajo (Small) | | | | | | | |
| 2-Year Flood | 558 | 543 | 549 | 530 | 513 | 513 | 516 |
| 5-Year Flood | 1,008 | 987 | 996 | 970 | 946 | 946 | 950 |
| 10-Year Flood | 1,535 | 1,508 | 1,519 | 1,486 | 1,456 | 1,456 | 1,460 |
| 25-Year Flood | 2,118 | 2,086 | 2,099 | 2,060 | 2,024 | 2,024 | 2,029 |
| Arroyo De Las Canas (Large) | | | | | | | |
| 2-Year Flood | 448 | 434 | 446 | 443 | 357 | 357 | 333 |
| 5-Year Flood | 989 | 966 | 986 | 981 | 842 | 842 | 803 |
| 10-Year Flood | 1,678 | 1,646 | 1,675 | 1,666 | 1,477 | 1,477 | 1,423 |
| 25-Year Flood | 2,483 | 2,443 | 2,477 | 2,468 | 2,231 | 2,231 | 2,163 |
| Rio Puerco Drainage | | | | | | | |
| Rock Tank Canyon (Small) | | | | | | | |
| 2-Year Flood | 1,544 | 1,355 | 1,490 | 1,384 | 1,236 | 1,236 | 1,364 |
| 5-Year Flood | 2,838 | 2,570 | 2,762 | 2,611 | 2,396 | 2,396 | 2,582 |
| 10-Year Flood | 4,363 | 4,020 | 4,267 | 4,073 | 3,797 | 3,797 | 4,037 |
| 25-Year Flood | 6,060 | 5,650 | 5,946 | 5,713 | 5,380 | 5,380 | 5,670 |
| Coyote Draw (Large) | | | | | | | |
| 2-Year Flood | 311 | 311 | 311 | 311 | 143 | 143 | 67 |
| 5-Year Flood | 1,811 | 1,811 | 1,811 | 1,811 | 1,329 | 1,329 | 1,053 |
| 10-Year Flood | 4,363 | 4,363 | 4,363 | 4,363 | 3,356 | 3,556 | 3,068 |
| 25-Year Flood | 7,799 | 7,799 | 7,799 | 7,799 | 6,662 | 6,662 | 5,960 |

TABLE 2-13 (continued)

A COMPARISON OF RUNOFF ESTIMATES FOR REPRESENTATIVE WATERSHEDS
(All values are in cfs)

LONG-TERM VALUES



| | EE | PA | NA/FE | LA | PCL | ESR | NG /1 |
|---|---|---|---|---|---|---|---|
| Rio Salado Drainage | | | | | | | |
| Ladron Mountain (Small) | | | | | | | |
| 2-Year Flood | 883 | 883 | 883 | 883 | 511 | 511 | 424 |
| 5-Year Flood | 2,236 | 2,236 | 2,236 | 2,236 | 1,577 | 1,577 | 1,411 |
| 10-Year Flood | 4,050 | 4,050 | 4,050 | 4,050 | 3,104 | 3,104 | 2,858 |
| 25-Year Flood | 6,235 | 6,235 | 6,235 | 6,235 | 5,009 | 5,009 | 4,684 |
| Canada Bonita (Large) | | | | | | | |
| 2-Year Flood | 803 | 737 | 785 | 748 | 673 | 673 | 720 |
| 5-Year Flood | 1,879 | 1,770 | 1,850 | 1,788 | 1,665 | 1,665 | 1,743 |
| 10-Year Flood | 3,280 | 3,130 | 3,240 | 3,155 | 2,984 | 2,984 | 3,092 |
| 25-Year Flood | 4,939 | 4,751 | 4,889 | 4,782 | 4,564 | 4,564 | 4,702 |

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

/1 Under the No Grazing Alternative only 52 percent of the land (public land) would not be grazed. The remaining 48 percent (private and other) would continue under heavy (60 to 80 percent) grazing.

Source: BLM Socorro District Files

TABLE 2-14

A COMPARISON OF INFILTRATION RATES
(Infiltration rates are in inches per hour)

| | | EE | PA | NA/FE | LA | PCL | ESR | NG /1 |
|---|---|---|---|---|---|---|---|---|
| Forage Utilization | | 60-80% | 40-60% | 40-60% | 40-60% | 20-40% | 20-40% | 0 |
| Grazing Pressure | | Heavy | Mod. | Mod. | Mod. | Light | Light | Ungrazed |
| Infiltration | A | 1.29 | 2.36 | 1.29 | 2.36 | 2.36 | 2.36 | 2.50 |
| Rate By | B | .95 | 1.59 | .95 | 1.59 | 1.59 | 1.59 | 2.13 |
| Hydrologic | C | .64 | .88 | .64 | .88 | .88 | .88 | .88 |
| Soil Group | D | .25 | .25 | .25 | .25 | .25 | .25 | .25 |
| Weighted Average | | .64 | .98 | .64 | .98 | .98 | .98 | 1.19 |

/1 The ungrazed conditions would only exist on public land; it is assumed that private and State land would continue to be under heavy grazing pressure.

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Hydrologic Soil Groups: A - Most infiltration/least runoff
B,C - Intermediates
D - Least infiltration/most runoff

Source: BLM Socorro District Files

Water in the Rio Puerco and Rio Salado is also very poor in quality. Sediment concentrations greater than 250,000 mg/1 have been recorded for the Rio Puerco and Rio Salado. In the period 1965-75, total dissolved solids (TDS) in the Rio Puerco reached concentrations as high as 9,060 mg/1; with sodium(2,300 mg/1), chloride (1,800 mg/1), and sulfate (4,100 mg/1) as the major dissolved solids. In the same period TDS in the Rio Salado ranged up to 3,000 mg/1; with sodium, calcium, bicarbonate, sulfate, and chloride as the major ions (USGS, 1965-75).

Water from other perennial stream reaches is also very poor in quality. Streamflow from seeps and springs in Arroyo Salado, Ojo Saladito, Arroyo Monte Largo, and Salt Spring is so salty that large salt deposits cover the streambed. Only Ponia Creek in the Rio Puerco drainage has good water quality.

The water quality of the earthen reservoirs is only slightly better than the quality of water in the perennial streams. Water, in these reservoirs which collect runoff from relatively small drainage areas, has not leached large amounts of salts from the land. Single measurements of the water quality of several earthen reservoirs revealed waters high in sulfate (221 mg/1), chloride (702 mg/1), bicarbonate (555 mg/1), calcium (644 mg/1), sodium (314 mg/1), and organic nitrogen (985 mg/1) (Kantz et al 1977).

Surface water is used for livestock and wildlife watering, irrigation purposes, and domestic use. Most surface waters in the area are suitable for stock watering (Tables 2-15 and 2-16); however, sulfate concentrations in the Rio Puerco and Rio Salado are often above the recommended limit of 1,000 mg/1. Most waters are unsuitable for human consumption because of the unpalatable taste and laxative effect caused by the high salt content, especially sulfate (Table 2-17) (Kantz et al 1977). Irrigation water from the Rio Salado, Rio Puerco, and Rio Grande is often above the recommended levels for TDS (2,000 mg/1); however, many areas in New Mexico have used water with TDS values much higher than recommended because of soil types and available water supply (New Mexico Water Quality Control Commission, 1975).

The types of non-point pollutants from grazing have been identified as sediments, turbidity, pathogens, and nutrients. Of the four, sediments are the most important. These pollutants are, in some cases, difficult to identify and quantify (e.g., this natural sedimentation along with man-caused sedimentation).

## GROUNDWATER RESOURCES

The type of aquifer, depth to groundwater, and well yields are highly variable in the ES Area. In general, depth to groundwater increases and well yields decrease with increasing distance from the Rio Grande.

The aquifers of the Rio Grande basin are predominantly of the valley fill and bedrock types. Valley fill aquifers include quaternary age alluvium and flood plain sediments that are saturated with water on the Rio Grande Valley floor and in the valleys of its major tributaries. Generally, large yields may be obtained from the valley fill aquifer in the inner Rio Grande where groundwater is used as a dependable source of municipal and irrigation water. The water table is within 6 or 8 feet of the ground surface near the river, and irrigation wells typically yield between 300 and 2,500 gallons per minute (Bushman, 1963). Away from the river the ground surface rises toward the mountains; but the water table rises very little. In these areas valley fill alluvium ranges from 100 to 400 feet deep; and the depth to water is often greater than 100 feet.

Bedrock aquifers in the Rio Grande basin are composed mostly of sandstone, conglomerate, or limestone (New Mexico State Engineer's Office, 1967). The most important bedrock aquifer, the Tertiary Santa Fe sandstone, is a very extensive and reliable aquifer which underlies the alluvium. The Santa Fe formation is favorable for development of wells yielding more than 100 gallons per minute (Spiegel, 1955).

Recharge to the Rio Grande aquifers is maintained by infiltration from the river which averages about 27 acre-feet per day. Recharge also occurs from precipitation and infiltration on adjacent mesas and from runoff and irrigation ditch flow (Theis and Taylor, 1939).

Groundwater resources in the Jornada closed basin are also of two general aquifer types. The uppermost stratigraphic unit of the basin is Bolson alluvium comprised of poorly sorted sands, gravels, and gypsiferous silts and clays. This important aquifer ranges up to 1,000 feet in thickness and produces sufficient yields for stock watering at depths of 30 to 400 feet (New Mexico Water Quality Control Commission, 1975). Recharge to this alluvium from the basin floor is minor compared to the channel infiltration that occurs in the ephemeral streams which drain surrounding mountainous areas. Recent channel alluvium is not considered to be an important aquifer, but rather a recharge source to the Bolson aquifer.

Other aquifers in the Jornada closed basin are the bedrock that underlie the Bolson alluvium. The Santa Fe and Datil formations may underlie the

TABLE 2-15

RECOMMENDED WATER QUALITY CRITERIA FOR LIVESTOCK AND WILDLIFE USE

| Parameter | |
|---|---|
| Salinity | TDS of less than 3,000 mg/l very satisfactory for all livestock and poultry |
| | TDS between 5,000 to 7,000 mg/l suitable for cattle, sheep, swine, and horses, but not for lactating animals or poultry |
| | TDS above 10,000 mg/l not recommended for use |
| Chloride | 1,500 mg/l or less suitable for all livestock and poultry |
| Fluoride | 2.0 mg/l or less suitable for all livestock and poultry |
| Sulfate | 1,000 mg/l or less suitable for most livestock<br>2,000 mg/l and above can be detrimental to cattle |
| Nitrate | 100 mg/l or less suitable for livestock and poultry |
| Arsenic | 0.2 mg/l or less suitable for livestock and poultry |
| Boron | 5 mg/l or less suitable for livestock and poultry |
| Cadmium | 0.05 mg/l or less suitable for livestock and poultry |
| Lead | 0.1 mg/l or less suitable for livestock and poultry |
| Mercury | 0.01 mg/l or less suitable for livestock and poultry |
| Selenium | 0.05 mg/l or less suitable for livestock and poultry |
| Gross alpha radiation | 15 pCi/l (EPA Drinking Water Standard) |
| Gross beta radiation | 50 pCi/l (EPA Drinking Water Standard) |

Sources: Federal Water Pollution Control Administration, 1968; and National Academy of Sciences and National Academy of Engineering, 1972

basin at moderate depth; however, these formations appear unlikely to yield large quantities of water except where the Santa Fe formation is relatively thick. The Dakota sandstone and the San Andres limestone underlie the basin at great depth and produce moderate yields of poor quality water (New Mexico Geological Survey, 1955).

Groundwater resources in the Rio Puerco drainage are complex and variable. East of the Rio Puerco fault zone (where the Llano del Rio Puerco intersects the Lucero uplift) groundwater is found at depths less than 200 feet in Tertiary bedrock (probably the Santa Fe sandstone) and thick alluvium. West of the fault groundwater is found at depths of around 200 feet in 2 primary aquifers of sandstone and limestone (Titus, 1963). Many springs emerge near the fault zone.

Groundwater resources in the Rio Salado drainage are not well known. The general depth to groundwater is between 200 and 500 feet; locally, water is available at shallower depths in the recent alluvium of arroyos and streams (Kantz et al 1977). Generalized groundwater maps indicate that this area is underlain by a thick, extensive aquifer system which extends under the San Augustine Plains (USGS, 1972).

## GROUNDWATER QUALITY

Groundwater quality is highly variable since wells and springs draw water from both shallow valley fill aquifers and deep bedrock aquifers. Shallow groundwater in the Rio Grande Valley is often highly mineralized due to repeated irrigation and seepage of surface water with high TDS content. Deeper wells in alluvium, especially near the Rio Grande Valley, have moderate salt contents, medium salinity hazards, and low sodium hazards (Titus, 1963). Bedrock aquifers, which are mainly limestone, are often high in dissolved solids (New Mexico State Engineer's Office, 1967). Springs east of the Rio Grande are high in TDS and sulfate, while springs west of the river are usually low in chloride and sulfate (Bushman, 1963). Groundwater in both the Rio Puerco and Rio Salado drainages is of poor to fair quality due to the abundance of soluble minerals in both alluvial deposits and bedrock formations found in this area (Spiegel, 1955). Some wells in the Rio Puerco and Rio Salado do have good water quality (less than 1,000 mg/1 TDS); it is mostly in places where recharge is by infiltration from surface runoff into alluvial fans or into broad, sandy arroyos (Spiegel, 1955). Groundwater in the Jornada basin is of poor chemical quality (New Mexico Geological Survey, 1955). The highly mineralized alluvium and bedrock deposits in the basin provide mostly saline groundwater that is not potable and often unfit for livestock (New Mexico Geological Survey, 1955). Relatively shallow wells (especially those in alluvial fan deposits) provide less saline water which is suitable for livestock and, in a few areas of the basin, for human consumption.

Groundwater in the area is used for livestock and wildlife watering, irrigation purposes, and domestic use. Using a consumptive rate of 12 gallons per day per animal unit, the 20,081 AUs presently consume approximately 269 acre-feet of water annually. Using a consumptive rate of 2 to 3 quarts per day per wildlife (deer and antelope) number, the 1981 wildlife numbers presently consume approximately 1.7 acre-feet per year. As most of this water is supplied by groundwater developments (approximately 80 percent), annual withdrawals for livestock and wildlife watering are estimated at 217 acre-feet. A comparison of livestock and wildlife water withdrawal is shown in Table 2-18. Since waters with TDS levels of 5,000 to 7,000 mg/1 are acceptable for livestock, most groundwater in the area is suitable for stock watering. There are, however, several wells east of the Rio Grande and in the Jornada closed basin which produce water unsuitable for irrigation or livestock use due to high concentrations of sulfate and TDS (Table 2-15). Fluoride concentrations and gross alpha radiation also exceed recommended values for irrigation in several wells. Very few wells produce water suitable for human consumption because of the high salt content, especially sulfate and chloride (Table 2-17). Gross alpha radiation and fluoride also exceed drinking water standards (Kantz et al 1977).

### *Future Environment*

The distribution and quality of surface water and groundwater are not expected to change greatly in the long term. Vegetative cover is expected to increase an average of 1 percent, thus runoff and sediment yields in the long term should decrease slightly from the existing situation. Groundwater withdrawals for livestock watering are expected to increase from present level of 270.7 to 271.7 acre-feet in the long term. This should have an insignificant effect on the groundwater resources in the area. The Future Environment is compared to the Existing Environment, Proposed Action, and the alternatives in Tables 2-13, 2-14, and 2-18.

### *Impacts*

## INFILTRATION

The removal or reduction of livestock would reduce grazing pressures from heavy to ungrazed and intermediate levels. This would lead to increased infiltration rates for most of the soils. Three hydrologic soil groups would have increased infiltration rates (Table 2-14). Soils in hy-

TABLE 2-16

STATE OF NEW MEXICO WATER QUALITY STANDARDS FOR SURFACE WATERS IN ES AREA

| Parameter | Standard |
|---|---|
| Oissolved oxygen | 4.0 mg/1 or higher |
| pH | between 6 and 9 units |
| Temperature | 32.2°C (90° F) or less |
| Fecal coliform bacteria | Monthly logarithmic mean of fecal coliform bacteria shall be less than 1,000/100 ml, and no more than 10 percent of the samples shall exceed 2,000/100 ml |
| TOS | 1,500 mg/1 or less if flowing water with discharge of 100 cfs or more |
| Sulfate | 500 mg/1 or less if flowing water with discharge of 100 cfs or more |
| Chloride | 250 mg/1 or less if flowing water with discharge of 100 cfs or more |
| Gross alpha radiation /1 | 30 pCi/1 |
| Gross beta radiation /1 | 3000 pCi/1 |

Study area is included in the following classification: Rio Grande Basin including the main stem of the Rio Grande from the headwaters of Elephant Butte Reservoir upstream to the Angostura Diversion Works, including any flow below the perennial reaches of the Rio Puerco and Jemez River which enters the main stem of the Rio Grande.

/1 General radiological criteria as set forth in Part 4 of New Mexico Environmental Improvement Board Radiation Protection Regulations. Adopted June 16, 1973.

Source: New Mexico Water Quality Control Commission; 1973; revised 1977.

TABLE 2-17

WATER QUALITY CRITERIA FOR HUMAN CONSUMPTION

| Parameter | Standard |
|---|---|
| Arsenic | 0.05 mg/1 or less /1 |
| Cadmium | 0.010 mg/1 or less /1 |
| Lead | 0.05 mg/1 or less /1 |
| Mercury | 0.002 mg/1 or less /1 |
| Nitrate (As N) | 10.0 mg/1 or less /1 |
| Selenium | 0.01 mg/1 or less /1 |
| Silver | 0.05 mg/1 or less /1 |
| Fluoride | 12° C and below - 2.4 mg/1 or less /1<br>12.1 to 14.6° C - 2.2 mg/1 or less /1<br>14.7 to 17.6° C - 2.0 mg/1 or less /1<br>17.7 to 21.4° C - 1.8 mg/1 or less /1<br>21.5 to 26.2° C - 1.6 mg/1 or less /1<br>26.3 to 32.5° C - 1.4 mg/1 or less /1 |
| Coliform bacteria | 4 organisms/100 ml in more than one sample when less than 20 are examined monthly /1 |
| Gross alpha radiation | 15 pCi/1 /1 |
| Gross beta radiation | 50 pCi/1 /1 |
| Ammonia* | 0.5 mg/1 or less /2 |
| Chloride* | 250 mg/1 or less /2 |
| Sulfate* | 250 mg/1 or less /2 |

* Recommended criteria

Sources: /1 Environmental Protection Agency National Interim Primary Drinking Water Regulations, July 9, 1976 (41 FR28402), 40 CFR 141.

/2 Recommend criterion by panel on public water supplies. National Academy of Sciences and National Academy of Engineering. 1972. Water Quality Criteria. Washington, D.C. 594 pp.

TABLE 2-18

A COMPARISON OF GROUNDWATER WITHDRAWAL FOR LIVESTOCK AND WILDLIFE WATERING

| | EE | PA | | NA/FE | | LA | | PCL | | ESR | | NG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | ST | LT | ST | LT | ST | LT | ST | LT | ST | LT | ST | LT |
| Livestock Animal Units | 20,081 | 15,804 | 20,529 | 19,108 | 20,200 | 15,804 | 19,724 | 13,931 | 23,183 | 12,674 | 23,598 | 11,006 | 11,006 |
| Groundwater Withdrawals acre-feet/year | 269 | 212 | 275 | 256 | 271 | 212 | 264 | 187 | 311 | 169 | 316 | 147 | 147 |
| Wildlife Numbers | 1,981 | 1,981 | 2,096 | 1,981 | 1,998 | 1,981 | 2,045 | 1,981 | 2,106 | 1,981 | 2,112 | 1,981 | 2,053 |
| Groundwater Withdrawals acre-feet/year | 1.7 | 1.7 | 1.8 | 1.7 | 1.7 | 1.7 | 1.7 | 1.7 | 1.8 | 1.7 | 1.8 | 1.7 | 1.7 |
| Total Withdrawals | 270.7 | 213.7 | 276.8 | 257.7 | 272.7 | 213.7 | 265.7 | 188.7 | 312.8 | 170.7 | 317.8 | 148.7 | 148.7 |

ST - Short Term
LT - Long Term

EE - Existing Environment
PA - Proposed Action
NA - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Source: Table A-24 and Table 2-28

drologic group D would not change under reduced grazing pressure due to shallow soil development and clay layers which restrict infiltration. Increased infiltration would be a long-term, area-wide impact. The infiltration model developed by Gifford, Hawkins, and Williams (1975) uses the same equation to predict infiltration rates for both moderate and light grazing pressure. The impact due to construction would be insignificant.

**Proposed Action** - As grazing pressure decreases from heavy (60 to 80 percent) to moderate (40 to 60 percent), the average infiltration rate is expected to increase to .98 inches per hour. This would be a 53-percent change from the existing .64 inches per hour.

**No Action Alternative** - Because of continued heavy (60 to 80 percent) grazing, infiltration would remain at the existing level of .64 inches per hour.

**Livestock Adjustment Alternative** - As grazing pressure decreases from heavy (60 to 80 percent) to moderate (40 to 60 percent), the average infiltration rate is expected to increase to .98 inches per hour. This would be a 53-percent increase over the existing .64 inches per hour. The change would occur at the same rate as the Proposed Action.

**Pasture Capacity Level Alternative** - As grazing pressure decreases from heavy (60 to 80 percent) to light (20 to 40 percent), a moderate increase in infiltration is expected, with an average infiltration rate of .98 inches per hour. This would be a 53-percent increase over the existing .64 inches per hour. The change would occur sooner than under the Proposed Action because of the greater (-30 versus -43 percent) livestock adjustment.

**Enhancement of Sensitive Resource Values Alternative** - As grazing pressure decreases from heavy (60 to 80 percent) to light (20 to 40 percent), a moderate increase in infiltration is expected with an average infiltration rate of .98 inches per hour. This would be a 53-percent increase over the existing .64 inches per hour. The change would occur sooner than the Proposed Action because of the greater (-30 versus -52 percent) livestock adjustment.

**No Grazing Alternative** - As grazing pressure decreases from a heavy to an ungrazed condition, an increase in infiltration is expected on public land. An average infiltration rate of 1.19 inches per hour would be achieved only on public land. This would be an 86-percent increase over the existing .64 inches per hour. The private and State land would continue to be grazed at existing levels. The average infiltration rate would remain at .64 inches per hour.

**RUNOFF**

Increased vegetative cover resulting from reduced grazing pressures would lead to decreased runoff (Table 2-13). The actual change in runoff would vary locally, depending upon the soil type and the cover increases. Existing Environment and Proposed Action cover values for each watershed were taken from the range survey and AMP data (Appendix 2, p. A-47). The changes in cover values from Existing Environment to Proposed Action are generally small (Appendix 4, Table A-23, p. A-82). Conversion factors for the alternatives were used to calculate new cover values and are presented in Appendix 4, p. A-79. In some cases the cover change was so small (0 to 1 percent) that no new cover values could be calculated. The cover values were used to predict future flood estimates for eight representative watersheds (Table 2-13). The changes in runoff would be an area-wide, long-term impact. Because less than .05 percent of total acreage would be disturbed by construction, the impact to runoff would be insignificant.

Because only public land is removed from grazing, the values for runoff for the No Grazing Alternative are larger than those for the Pasture Capacity Level and Enhancement of Sensitive Resource Values Alternatives. Public land represents only about 52 percent of the ES Area. The remaining 48 percent (private and other) would continue to be grazed at existing levels.

**Proposed Action** - An average increase of 4 percent in vegetative cover would result in an average decrease of 3 percent in runoff.

**No Action Alternative** - An average increase of 1 percent in vegetative cover would result in an average decrease of 1 percent in runoff.

**Livestock Adjustment Alternative** - An average increase of 2 percent in vegetative cover would result in an average decrease of 3 percent in runoff.

**Pasture Capacity Level Alternative** - An average increase of 7 percent in vegetative cover would result in an average decrease of 12 percent in runoff.

**Enhancement of Sensitive Resource Values Alternative** - An average increase of 7 percent in vegetative cover would result in a 12-percent average decrease in runoff.

**No Grazing Alternative** - An average increase of 5 percent in vegetative cover would result in a 16-percent average decrease in runoff.

**SURFACE WATER QUALITY**

Reductions in runoff and sediment yields resulting from the reduced grazing pressures would produce a slight improvement in the quality of surface runoff. The result would be a small decline in

suspended and dissolved solids, including major cations and anions. This long-term, area-wide impact cannot be quantified due to lack of historical data relating water quality to streamflow in ephemeral streams. The impact of construction would be insignificant on surface water quality.

In the unique riparian areas vegetative improvement cannot be quantified. However, overall utilization is reduced from heavy to moderate. An insignificant improvement in water quality should result from the Proposed Action and the alternatives (Table 2-2).

**Proposed Action** - Because of an average runoff decrease of 3 percent, a slight improvement in surface water quality would be expected. This improvement cannot be quantified.

**No Action Alternative** - The average runoff decrease of 1 percent would not be enough to change surface water quality.

**Livestock Adjustment Alternative** - The runoff decrease of 3 percent would produce a slight increase in surface water quality. This improvement cannot be quantified.

**Pasture Capacity Level Alternative** - The runoff decrease of 6 percent would produce a slight increase in surface water quality. This improvement cannot be quantified.

**Enhancement of Sensitive Resource Values Alternative** - The runoff decrease of 12 percent would produce a slight increase in surface water quality. This improvement cannot be quantified.

**No Grazing Alternative** - The runoff decreases of 16 percent should improve surface water quality. This improvement cannot be quantified.

## GROUNDWATER RESOURCES

Improved infiltration resulting from reduction of grazing pressure could increase the recharge to groundwater. The magnitude of this long- term, area-wide impact is difficult to predict. Table 2-14 presents infiltration rates for the hydrologic soil groups under the various grazing pressures expected with the Proposed Action and alternatives. Exactly how much of this infiltration would actually replenish groundwater is unknown. Any water infiltrating the soil would replenish soil moisture and is not likely to reach the water table.

Impact on groundwater quality would probably be insignificant. It would be difficult to measure the actual effect, if any, that grazing has on groundwater quality.

Table 2-18 shows the estimated groundwater withdrawals under the Proposed Action and alternatives. The amount of groundwater withdrawals was calculated based on cattle consuming 12 gallons of water per day and deer and antelope 2 to 3 quarts of water per day. The existing groundwater withdrawal is 271 acre-feet per year.

**Proposed Action** - The groundwater withdrawals would be 214 acre-feet per year in the short term and 277 acre-feet per year in the long term.

**No Action Alternative** - Groundwater withdrawals would be 258 acre-feet per year short term and 273 acre-feet per year long term.

**Livestock Adjustment Alternative** - Groundwater withdrawals would be 214 acre-feet per year in the short term and 266 acre-feet per year in the long term.

**Pasture Capacity Level Alternative** - Groundwater withdrawals would be 189 acre-feet per year in the short term and 313 acre-feet per year in the long term.

**Enhancement of Sensitive Resource Values Alternative** - Groundwater withdrawals would be 171 acre-feet per year in the short term and 318 acre-feet per year in the long term.

**No Grazing Alternative** - Groundwater withdrawals would be 149 acre-feet per year in both the short and long terms.

## CUMULATIVE IMPACTS

**Proposed Action** - The 4-percent average increase in cover and the 53-percent average increase in the infiltration rate would result in a 4-percent average decrease in runoff. This is a long-term, area-wide impact and is not considered significant.

**No Action Alternative** - The 1-percent average increase in cover and the maintenance of the existing infiltration rate would result in a 1-percent average decrease in runoff. This is a long-term, area-wide impact and is not considered significant.

**Livestock Adjustment Alternative** - The 2-percent average increase in cover and the 53-percent average increase in the infiltration rate would result in a 3-percent average decrease in runoff. This is a long-term, area-wide impact and is not considered significant.

**Pasture Capacity Level Alternative** - The 7-percent average increase in cover and the 53-percent average increase in the infiltration rate would result in a 12-percent average decrease in runoff. This is a long-term, area-wide impact and is not considered significant.

**Enhancement of Sensitive Resource Values Alternative** - The 7- percent average increase in cover and the 53-percent average increase in the infiltration rate would result in a 12-percent average decrease in runoff. This is a long-term, area-wide impact and is not considered significant.

**No Grazing Alternative** - The 5-percent average increase in cover and the 86-percent average increase in the infiltration rate would result in a 16-percent average decrease in runoff. An average infiltration rate of 1.19 inches per hour would be achieved only on public land. The private and

State land would continue to be grazed at existing levels. The average infiltration rate would remain at .64 inches per hour. This is a long-term, area-wide impact and is considered significant.

## LIVESTOCK GRAZING

### *Existing Environment*

#### INTRODUCTION

There are 102 BLM operators with grazing privileges in the East Socorro ES Area. The relationship of grazing in this area to livestock production at the national and State levels is shown below. Data is from Public Land Statistics (1976) and from Thomas (1973):

Cattle Production -
- in the U.S.
  - 11 western states - 19 percent
  - 11 western states (BLM) - 3.4 percent
  - New Mexico - .61 percent
  - New Mexico (BLM) - .2 percent
  - East Socorro ES Area - .01 percent
- in the 11 Western States
  - 11 western states (BLM) - 17.8 percent
  - New Mexico (BLM) - 1.19 percent
  - East Socorro ES Area - .06 percent
- in New Mexico
  - New Mexico (BLM) - 37 percent
  - East Socorro ES Area - 1.8 percent

#### OPERATIONS

At present there are 29 operators involved in the 25 existing AMP allotments (Appendix 1, Table A-1, p. A-1). The remaining 73 operators in the area operate 96 non-AMP allotments. Twenty-two (22) operators are combined in ten existing community allotments (Table 2-19).

#### LIVESTOCK

Cattle and horses are the only classes of livestock which are licensed in the ES Area. Some operators maintain a few horses which are used for ranch work or for breeding stock.

One hundred (100) of the operators have cow-calf operations. In these operations cows produce a calf crop each year. Some calves are retained for herd replacement, but most are sold between the ages of 6 and 12 months. Most operators have a yearlong breeding program. Although this results in calves being born throughout the year, most are born during spring and fall. Therefore, most calves are shipped to market from October through November.

Two operators run steer operations; therefore, a base breeding herd is not maintained. Weaned calves or yearling steers are obtained elsewhere, held on the allotment for a specified period, and then marketed. During periods of favorable moisture, some cow-calf operators will run a small scale steer operation with some of their weaned calves. This practice is in addition to their normal operation.

Hereford is the most common breed of cattle in the ES Area. Other breeds include: Angus, Brangus, Charolais, Brahma, and Santa Gertrudis. Cross breed cows are common, with the Hereford-Angus cross being most popular. However, most bulls are not cross breeds.

Actual livestock use data is unknown in much of the ES Area. Informal conversations with some allottees indicate they graze fewer AUMs than they are presently licensed for. By maintaining a high level of licensed use, some allottees can retain the option to vary the amount of livestock they graze up to the present licensed use without having to apply to BLM for changes. Maintaining a high licensed use also implies that the allotment can carry that number of livestock. This may tend to inflate the actual market value of the base property because its market value is often based on the existing grazing use and not on true grazing capacity.

#### SEASON OF USE

Yearlong use is allowed on 118 allotments involving 96 operators; seasonal use is allowed on 3 allotments involving 6 operators. Yearlong use provides grazing of livestock for 12 continuous months on all or part of an allotment.

### *Future Environment*

The 29 operators included in the 25 existing AMP allotments would continue to operate under those plans. These 25 existing AMP allotments would be intensively managed. Operators would receive adjustments in grazing use on 19 of the 25 existing AMP allotments. Modifications to the existing grazing systems would occur on 15 AMP allotments. The remaining 91 operators who operate 96 non-AMP allotments and the two unallotted allotments would be managed as they are at present. The 102 operators would graze 20,200 AUs (Table 2-19). There would be no new community allotments nor would additional operators be restricted to seasonal use.

### *Impacts*

#### OPERATIONS

As the livestock adjustments and utilization levels change under the Proposed Action and alternatives, the number of operators who have AMP allotments, non-AMP allotments, or are eliminated from grazing would change. Also the number of operators combined into community al-

TABLE 2-19

SUMMARY OF OPERATIONS AND LIVESTOCK NUMBERS

| | EE | | PA | | | | NA/FE | | | | LA | | | | PCL | | | | ESR | | | | NG /1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Short Term | | Long Term | | Short Term | | Long Term | | Short Term | | Long Term | | Short Term | | Long Term | | Short Term | | Long Term | | Short & Long Term | |
| | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. | Oper. | Allot. |
| AMP Operators | | | | | | | | | | | | | | | | | | | | | | | | |
| With One Allotment | 18 | 18 | 41 | 41 | 41 | 41 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 18 | 41 | 41 | 41 | 41 | 38 | 38 | 41 | 41 | 0 | 0 |
| With More Than One Allotment | 1 | 3 | 5 | 13 | 5 | 13 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 5 | 13 | 5 | 13 | 5 | 13 | 5 | 13 | 0 | 0 |
| Community Allotment | 8 | 3 | 22 | 10 | 23 | 10 | 8 | 3 | 8 | 3 | 8 | 3 | 8 | 3 | 22 | 10 | 23 | 10 | 21 | 9 | 23 | 10 | 0 | 0 |
| Community Allotment and Individual AMP Allot. | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 0 | 0 |
| Non-AMP Operators | | | | | | | | | | | | | | | | | | | | | | | | |
| With One Allotment | 44 | 44 | 13 | 13 | 14 | 14 | 44 | 44 | 44 | 44 | 38 | 39 | 40 | 40 | 13 | 13 | 14 | 14 | 12 | 12 | 14 | 14 | 70 | 58 |
| With More Than One Allotment | 15 | 39 | 0 | 0 | 0 | 0 | 15 | 39 | 15 | 39 | 15 | 39 | 15 | 39 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 17 | 51 |
| Community Allotment | 12 | 6 | 0 | 0 | 0 | 0 | 12 | 6 | 12 | 6 | 12 | 6 | 12 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Community Allotment and Individual Non-AMP Allotment | 2 | 4 | 0 | 0 | 0 | 0 | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Combined Non-AMP and AMP Operators | | | | | | | | | | | | | | | | | | | | | | | | |
| At Least One of Each | 2 | 4 | 9 | 20 | 9 | 20 | 2 | 4 | 2 | 4 | 2 | 4 | 2 | 4 | 9 | 20 | 9 | 20 | 9 | 20 | 9 | 20 | 0 | 0 |
| AMP and Non-AMP Community Allotment | 0 | 0 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 0 | 0 |
| AMP, Non-AMP and Community Non-AMP Allotment | 0 | 0 | 1 | 3 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 0 | 0 |
| Other Operators in Community Allotments Tallied Above | 0 | 0 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 0 | 3 | 0 | 3 | 0 | 0 | 0 |
| Sub Total | 102 | 121 | 96 | 104 | 98 | 105 | 102 | 121 | 102 | 121 | 96 | 116 | 98 | 117 | 96 | 98 | 98 | 105 | 91 | 104 | 98 | 105 | 87 | 109 |
| Elimination of Grazing Operators | 0 | 0 | 6 | 5 | 4 | 4 | 0 | 0 | 0 | 0 | 6 | 5 | 4 | 4 | 6 | 5 | 4 | 4 | 11 | 10 | 4 | 4 | 15 | 14 |
| Unallotted Allotments | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 2 | 0 | 0 |
| GRAND TOTAL | 102 | 123 | 102 | 111 | 102 | 111 | 102 | 123 | 102 | 123 | 102 | 123 | 102 | 123 | 102 | 111 | 102 | 111 | 102 | 111 | 102 | 111 | 102 | 123 |
| Estimated Livestock AUs | | | | | | | | | | | | | | | | | | | | | | | | |
| Public | | 9,004 | | 6,313 | | 9,190 | | 8,368 | | 9,240 | | 6,313 | | 8,758 | | 5,193 | | 11,004 | | 4,483 | | 11,473 | | 0 |
| Private and State /2 | | 11,077 | | 9,491 | | 11,339 | | 10,740 | | 10,960 | | 9,491 | | 10,966 | | 8,738 | | 12,179 | | 8,191 | | 12,125 | | 11,006 |
| Total /2 | | 20,081 | | 15,804 | | 20,529 | | 19,108 | | 20,200 | | 15,804 | | 19,724 | | 13,931 | | 23,183 | | 12,674 | | 23,598 | | 11,006 |

/1 Grazing would continue on State and private lands in these allotments.
/2 On Non-AMP allotment, non-public land AUMs were estimated.

EE - Existing Environment
PA - Proposed Action
NA/FE- No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

Source: Summary of Appendix 1, Table A-1, p. A-1 and Appendix 5, Table A-24, p. A-83

lotments would vary. The proposed community allotments could limit the affected operators' livestock management practices, such as breeding programs, range developments, maintenance of range developments, breed of cattle, and supplemental feeding and salting.

Table A-24, Appendix 5, p. A-83, lists each operator and the allotment or allotments that he controls. The table shows the number of AUMs each operator would have in the existing situation, Proposed Action, and alternatives in the short and long terms. Table 2-19 summarizes the various kinds of operations (i.e., AMP, non-AMP, and/or community allotment) and the number of allotments involved. It also shows the estimated livestock AUs (including estimated AUs on non-public lands in non-AMP allotments) in the short and long term for the Proposed Action and alternatives.

**Proposed Action** - In the short term 74 operators would be operating AMP allotments; 13 operators would be operating non-AMP allotments; and 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on five allotments involving six operators. In the long term 75 operators would be operating AMP allotments; 14 operators would be operating non-AMP allotments; and 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on four allotments, all on public land, involving four operators. Ninety-six (96) operators would graze 15,804 AUs in the short term. Ninety-eight (98) operators would graze 20,529 AUs in the long term (Table 2-19).

Three community allotments are proposed in addition to the ten existing ones. Two operators would be combined into allotment 037 and two into allotment 271. The two operators in each of the proposed community allotments have been unofficially running the allotments together. Each pair of operators involved is related and has had combined operations for several years. There would be no impact on these operators. Three operators would be combined into allotment 250. Socorro District Office records indicate that none of the three are presently using their allotments. Therefore, prior to implementation of the AMP, a breed of cattle and management practices would have to be agreed upon. For the most part, community allotments would require more individual work from each operator, especially when personal conflicts arise and operators cannot work together as a group. Management of livestock would suffer. The impacts resulting from personal conflicts cannot be quantified with existing data.

**No Action Alternative** - The 29 operators included in the 25 existing AMP allotments would continue to operate under those plans. The 25 existing AMP allotments would be intensively managed. Operators would receive adjustments in grazing use on 19 of the 25 existing AMP allotments. Modifications to the existing grazing systems would occur on 15 AMP allotments. The remaining 73 operators who operate 96 non-AMP allotments and the 2 unallotted allotments would be managed as they are at present. One hundred and two (102) operators would graze 19,108 AUs in the short term and 20,200 AUs in the long term (Table 2-19). There would be no new community allotments.

**Livestock Adjustment Alternative** - The 29 operators included in the 25 existing AMP allotments would continue to operate under those plans. The 25 existing AMP allotments would be intensively managed. Operators would receive adjustments in grazing use on 19 of the 25 existing AMP allotments. Modifications to the existing grazing systems would occur on 15 AMP allotments. The remaining 67 operators who operate 91 non-AMP allotments would receive livestock adjustments. The two unallotted allotments would remain unallotted. These adjustments would cause grazing to be eliminated on five allotments involving six operators in the short term. In the long term grazing would be eliminated on four allotments, all public land, involving four operators (Appendix 1, Table A-1, p. A-1). Ninety-six (96) operators would graze 15,804 AUs in the short term. Ninety-eight (98) operators would graze 19,724 AUs in the long term (Table 2-19). There would be no new community allotments.

**Pasture Capacity Level Alternative** - In the short term 74 operators would be operating AMP allotments; 13 operators would be operating non-AMP allotments; and 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on five allotments involving six operators. In the long term 75 operators would be operating AMP allotments; 14 operators would be operating non-AMP allotments; and 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on four allotments, all on public land, involving four operators. Ninety-six (96) operators would graze 13,931 AUs in the short term. Ninety-eight (98) operators would graze 23,183 AUs in the long term (Table 2-19).

Three community allotments are proposed in addition to the ten existing ones. Two operators would be combined into allotment 037 and two into allotment 271. The two operators in each of the proposed community allotments have been unofficially running the allotments together. Each pair of operators involved is related and has had combined operations for several years. There would be no impact on these operators. Three

operators would be combined into allotment 250. Socorro District Office records indicate that none of the three are presently using their allotments. Therefore, prior to implementation of the AMP, a breed of cattle and management practices would have to be agreed upon. For the most part, community allotments would require more individual work from each operator, especially when personal conflicts arise and operators cannot work together as a group. Management of livestock would suffer. The impacts resulting from personal conflicts cannot be quantified with existing data.

**Enhancement of Sensitive Resource Values Alternative** - In the short term 70 operators would be operating AMP allotments; 12 operators would be operating non-AMP allotments; and 9 would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on ten allotments involving eleven operators. In the long term 75 operators would be operating under AMPs; 14 operators would be operating non-AMP allotments; and 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on four allotments, all on public land, involving four operators. Ninety-one (91) operators would graze 12,674 AUs in the short term. Ninety-eight (98) operators would graze 23,598 AUs in the long term (Table 2-19).

Three community allotments are proposed in addition to the ten existing ones. Two operators would be combined into allotment 037 and two into allotment 271. The two operators in each of the proposed community allotments have been unofficially running the allotments together. Each pair of operators involved is related and has had combined operations for several years. There would be no impact on these operators. Three operators would be combined into allotment 250. Socorro District Office records indicate that none of the three are presently using their allotments. Therefore, prior to implementation of the AMP, a breed of cattle and management practices would have to be agreed upon. For the most part, community allotments would require more individual work from each operator, especially when personal conflicts arise and operators cannot work together as a group. Management of livestock would suffer. The impacts resulting from personal conflicts cannot be quantified with existing data.

**No Grazing Alternative** - Grazing would be eliminated on all public land in the area. This would cause grazing to be eliminated on fourteen allotments, all on public land, involving fifteen operators. The remaining 87 operators would continue to run 11,006 AUs on private and State land that they own and/or control on 109 allotments (Table 2-19).

## SEASON OF USE

Seasonal grazing refers to an allotment being available for use by domestic livestock only during a set period of time each year. If an allotment has a seasonal grazing system, then the allotment's operator would be required to find pasturage for his herd on other than public land during the period of time that grazing is prohibited, or he would have to sell his herd.

**Proposed Action** - Fourteen operators would have seasonal grazing systems in addition to the six existing seasonal use operators. Only three of the fourteen would be impacted because they do not have other pasturage. The three operators presently run 26, 8, and 2 AUs.

**No Action Alternative** - There would be no impact.

**Livestock Adjustment Alternative** - There would be no impact.

**Pasture Capacity Level Alternative** - Fourteen operators would have seasonal grazing systems in addition to the six existing seasonal use operators. Only three of the fourteen would be impacted because they do not have other pasturage. The three operators presently run 26, 8, and 2 AUs.

**Enhancement of Sensitive Resource Values Alternative** - Fourteen operators would have seasonal grazing systems in addition to the six existing seasonal use operators. Only three of the fourteen would be impacted because they do not have other pasturage. The three operators presently run 26, 8, and 2 AUs.

**No Grazing Alternative** - One of the six existing seasonal use operators, who is totally dependent upon public land grazing, would have his grazing use eliminated. The five other seasonal use operators could graze livestock on their private and State land.

## CUMULATIVE IMPACTS

**Proposed Action** - In the long term 75 operators would be operating AMP allotments; 14 operators would be operating non-AMP allotments; and 9 operators would be involved on both AMP and non-AMP allotments. Grazing would be eliminated on four allotments, all on public land, involving four operators. Ninety-eight (98) operators would graze 20,529 AUs. Three new community allotments are proposed involving seven operators. Fourteen operators would be restricted to seasonal use. Only three of the fourteen additional operators would be impacted as they do not have other pasturage.

**No Action Alternative** - The 29 operators included in the 25 existing AMP allotments would continue to operate under those plans. However, livestock adjustments would occur on 19 of the existing 25 AMP allotments and modifications to

the existing grazing systems would occur on 15 AMP allotments. The remaining 73 operators who operate 96 non-AMP allotments and the 2 unallotted allotments would be managed as they are at present. One hundred and two (102) operators would graze 20,200 AUs in the long term.

**Livestock Adjustment Alternative** - The 29 operators included in the 25 existing AMP allotments would continue to operate under those plans. However, livestock adjustments would occur on 19 of the existing 25 AMP allotments and modifications to the grazing systems would occur on 15 AMP allotments. The remaining 67 operators who operate 91 non-AMP allotments and the 2 unallotted allotments would be managed as they are at present. Four allotments involving four operators, all on public land, would be eliminated from grazing. Ninety-eight (98) operators would graze 19,724 AUs in the long term.

**Pasture Capacity Level Alternative** - In the long term 75 operators would be operating AMP allotments; 14 operators would be operating non-AMP allotments; 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on four allotments, all on public land, involving four operators. Ninety-eight (98) operators would graze 23,183 AUs. Three new community allotments are proposed involving seven operators. Fourteen additional operators would be restricted to seasonal use. Only three of the fourteen operators would be impacted as they do not have other pasturage.

**Enhancement of Sensitive Resource Values Alternative** - In the long term 75 operators would be operating AMP allotments; 14 operators would be operating non-AMP allotments; 9 operators would be involved in both AMP and non-AMP allotments. Grazing would be eliminated on four allotments, all on public land, involving four operators. Ninety-eight (98) operators would graze 23,598 AUs. Three new community allotments are proposed involving seven operators. Fourteen additional operators would be restricted to seasonal use. Only three of the fourteen operators would be impacted as they do not have other pasturage.

**No Grazing Alternative** - Grazing would be eliminated on all public land in the area. This would cause grazing to be eliminated on fourteen allotments, all on public land, involving fifteen operators including one of the six existing seasonal use operators. The remaining 87 operators would continue to run 11,006 AUs on the private and State land they own and/or control.

## SOCIO-ECONOMICS

### *Existing Environment*

#### INTRODUCTION

The socio-economic impact area differs slightly from the ES Area in that the boundaries have been extended to include nearby trade centers (Map 2-6). Communities in or adjacent to the ES Area and their populations are: Socorro - 6,014, San Antonio - 475, Bingham - 6, Magdalena - 652, Polvadera - 350, Escondida - 36, Riley - 12, Belen - 5,825, and Los Lunas - 977. Bingham and Riley are the only communities within the boundaries. The area produces raw materials with little or no processing beyond the first stages. Livestock grazing is the traditional source of the local economy and surrounding areas. However, there is irrigated farmland scattered along the Rio Grande.

Persistent poverty, unemployment, and underemployment are dominant characteristics in Socorro County and surrounding counties. In October 1977 Socorro County ranked fourth highest of the State's 32 counties as recipient of financial and food stamp assistance. Approximately 21 percent of the County population was receiving financial and food stamp assistance from the State's Social Welfare Program. Valencia and Socorro Counties ranked 22nd and 25th, respectively, among the State's lowest in per capita income (U. S. Bureau of Census, 1970).

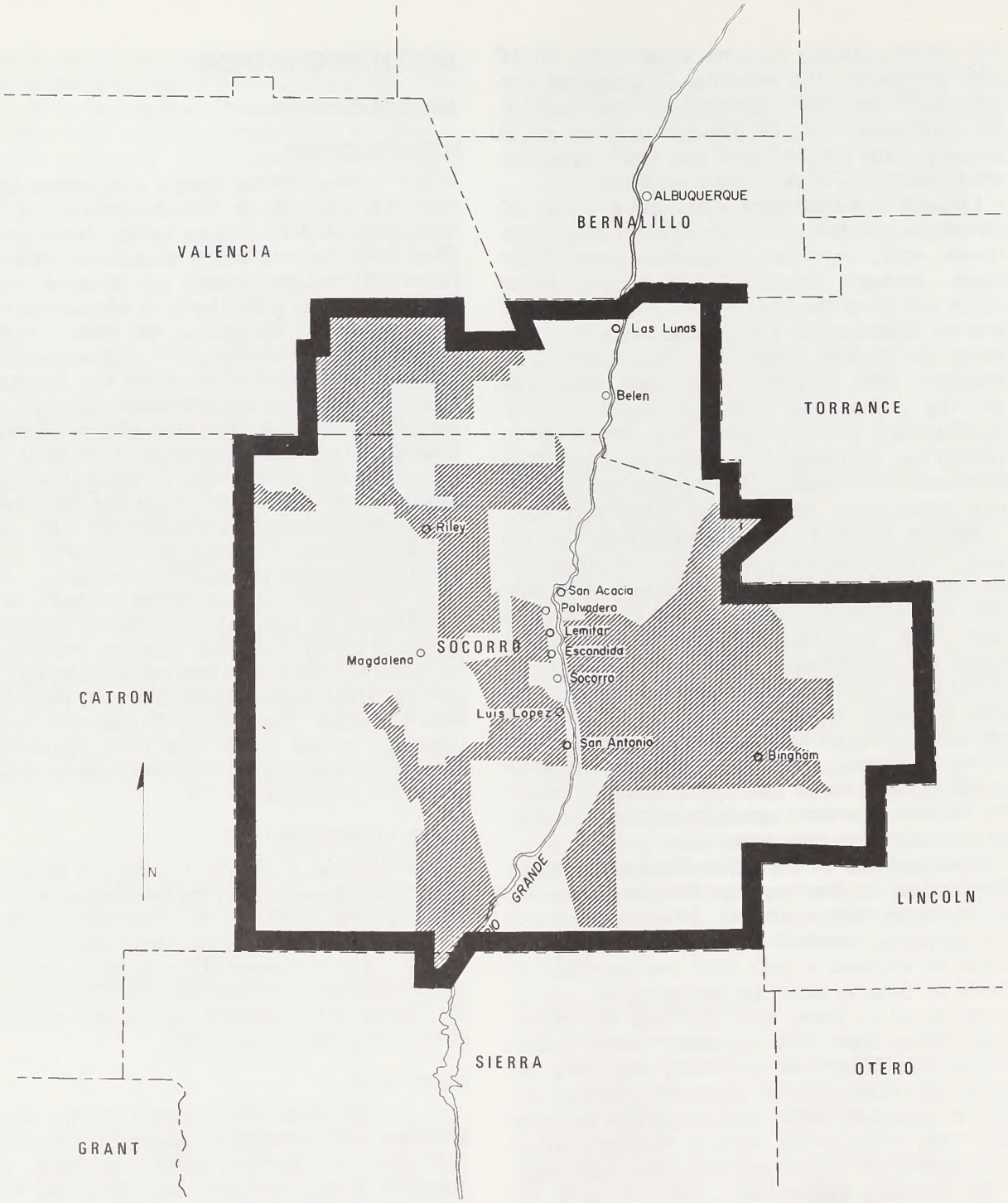
#### LAND OWNERSHIP

The ES Area consists of 1,650,214 acres (approximately 3 percent) of the total land area of the State (Table 2-20). BLM administers 838,808 acres (52.2 percent) of the area which includes 23,052 acres of Bureau of Reclamation (BR) land. State ownership consists of 293,158 acres (approximately 17.8 percent), and private ownership is 495,196 acres (30 percent).

#### LAND USE

In the ES Area 99.7 percent of the land is wildlands used primarily for grazing. The remaining uses include developed lands and roads. BLM manages grazing on public and BR lands. These lands supply 45 percent of the AUMs in the area (Appendix 6, Table A-25, p. A-88). Private and State land supply the remaining 55 percent of the AUMs.

The majority of recreational users in the area are from Belen, Los Lunas, and Socorro. The principal recreational activities pursued are hunting, sightseeing, and off-road vehicle (ORV) touring. There are no developed recreation sites within the ES Area. Developed recreation sites exist in the Cibola National Forest and in the communities of




LEGEND

COUNTY BOUNDARY

SOCIO-ECONOMIC IMPACT AREA

EAST SOCORRO ENVIRONMENTAL STATEMENT AREA

SCALE IN MILES

10 0 10 20 30 40

(Source: BLM Socorro District Files and Southwest Research & Development Co., 1977)

**MAP 2-6. Socio-Economic Impact Area**

Belen and Socorro. Many hunters and recreationists visiting the area have campers or stay only for a day. Their purchases are generally minimal and, as a result, little income is derived from recreational activities.

## POPULATION

The ES Area is a large, sparsely populated, rural area. There is no accurate method, except a census, for determining the exact population. However, the total population is estimated to be 1,167. Total ranch population is estimated to be 412 (Southwest Research and Development Company, 1977). Ninety (90) percent of the total ranch population live in Socorro County - population 9,899 (Bureau of Census, 1975). Of the 102 families utilizing public lands from grazing, 59 percent of the heads of household are between the ages of 50-69. Ninety-four (94) of these operators are resident ranchers or persons who live on or adjacent to their ranch holdings; 2 percent live in other counties; and 5 percent live out of state and maintain their ranches on an absentee basis during the year.

Data on racial/ethnic composition indicates that in Socorro County, 8,909 or 90 percent are Anglo or Hispanic (Bureau of Census, 1975). Hispanic makes up approximately 5,939 (66.6 percent) of the population and Anglo 2,970 (23.4 percent). The surrounding counties also have a high concentration of Hispanic: Valencia, 56 percent; Torrance, 52.6 percent; and Sierra, 35.8 percent (U. S. Bureau of Census, 1975). The ethnic breakdown of the 102 BLM permittees is 56 Anglo, 44 Hispanic, and 2 Native American (BLM Socorro District Files).

## INCOME

Total direct income generated in the ES Area from three industrial sectors is estimated at $3,339,927 with 75 percent attributable to the range livestock industry ($1,601,508, or 48 percent, is attributable to public land), 25 percent to the transportation and public utilities sector, and less than 1 percent to mining and other sectors (Table 2-21). Total indirect income of the area is estimated at $9,226,515 with range livestock accounting for 86 percent. Livestock on public lands accounts for $5,082,866 or 55 percent (Table 2-21).

Non-farm family income of all ES Area BLM operators was an estimated $686,629 in 1977, with income from off-farm employment in transportation, construction, and utilities accounting for over 33 percent of this total (Table 2-22). Over half of the non-farm income was received by operators of subsistence-type enterprises. In 1973 annual cash receipts (income) from all livestock grazing varied from an average of $489 per operator in the subsistence small ranch category to $98,656 per operator in the large ranch category. For all operators the total income was $2,507,057; total costs were $1,483,996; and total net returns were $1,068,884 (Appendix 6, Table A-26, p. A-92).

## EMPLOYMENT

There are 76 individuals (both farm and non-farm workers) in the ES Area who are covered by unemployment compensation and social security. Range livestock accounts for 47, transportation and public utilities 16, mining 12, and other 1. Employment in the transportation and public utilities sector consists primarily of part-time jobs such as school bus driving. The operators and their families directly working on the ranch are not included in the above employment figures. It is estimated that of the total ranch labor, operators and their families provide 63 percent; full-time hired labor, 13 percent; seasonal monthly hired labor, 22 percent; and hired day labor, 2 percent. Illegal aliens are often used as occasional ranch labor (Southwest Research and Development Company, 1977). Table 2-23 shows average estimates of employment, wage rates, and labor costs in the ES Area livestock sector.

Off-farm employment of ranch families (ranch operators and spouses) totaled 83 positions. They were in such areas as trade, public services, transportation, construction, and utilities and private services; the latter was the most common (Table 2-22).

The average annual unemployment rates for the counties that are part of, or adjacent to, the ES Area are: Sierra, 6.3 percent; Socorro, 8.1 percent; Torrance, 8.8 percent; and Valencia, 7.5 percent. The average annual unemployment rate for New Mexico is 7.8 percent (Personal Communication, New Mexico Employment Security Commission, 1978).

## ATTITUDES AND LIFESTYLES

In the ES Area ranchers and their families are probably the most dominant users and most interested in the public lands. This is because they are usually directly dependent on the grazing resource. The ranching interest group feels that it will become more difficult to earn an adequate income, particularly using public lands, because of declining range improvement programs and declining predator and rodent control programs (Southwest Research and Development Co., 1977).

A major problem in pursuing a ranching lifestlye is the availability of capital. Adequate capital is needed to obtain or expand a ranch, purchase

TABLE 2-20

LAND OWNERSHIP, 1975-77

| Ownership | COUNTIES Sierra | Socorro | Torrance | Valencia | ES Area | Percent of Total |
|---|---|---|---|---|---|---|
| | Acres | | | | | |
| Bureau of Land Management | 14,320 | 715,838 | 760 | 107,890 | 838,808 | 50.8 |
| Bureau of Reclamation | 6,618 | 16,434 | 0 | 0 | 23,052 | 1.4 |
| Private | 1,760 | 333,994 | 11,738 | 147,704 | 495,196* | 30.0 |
| State | 1,145 | 244,329 | 11,852 | 35,832 | 293,158* | 17.8 |
| Total | 23,843 | 1,310,595 | 24,350 | 291,426 | 1,650,214* | 100.0 |

* Includes land in non-AMP allotments

Source: BLM Socorro District Office

TABLE 2-21

INCOME BY INDUSTRIAL SECTOR

| Sector | Direct Income (Dollars) | % of Direct Income | Indirect Income (Dollars) | % of Indirect Income |
|---|---|---|---|---|
| Transportation and Public Utilities | 821,600 | 25 | 1,242,670 | 13 |
| Agriculture | | | | |
| Range livestock | 2,507,057* | 75 | 7,956,898* | 86 |
| Public land livestock | (1,601,508)* | (48) | (5,082,866)* | (55) |
| Other | 6,450 | 0 | 13,389 | 0 |
| Mining | 4,820 | 0 | 13,558 | 0 |
| Total | 3,339,927 | 100 | 9,226,515 | 99** |

* Denotes 1975 Dollars
** Percent does not add to 100 because of rounding error.

Source: Southwest Research and Development Co. and BLM Socorro District Files

TABLE 2-22

ESTIMATED NON-FARM JOBS AND NON-FARM INCOME OF RANCH FAMILIES BY SIZES OF RANCHES, 1975

| Economic Sector | Average Rate Dollars | Subsistence Ranches Dollars | Subsistence Ranches Numbers | Small Ranches Dollars | Small Ranches Numbers | Medium-size Ranches Dollars | Medium-size Ranches Numbers | Large Ranches Dollars | Large Ranches Numbers | All Ranches Dollars | All Ranches Numbers |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Mining | --- | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Manufacturing | 8,266 | 8,266 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 8,266 | 1 |
| TCU 1/ | 13,101 | 104,808 | 8 | 65,505 | 5 | 26,202 | 2 | 13,101 | 1 | 209,616 | 16 |
| Trade | 5,819 | 40,733 | 7 | 64,009 | 11 | 34,914 | 6 | 0 | 0 | 139,656 | 24 |
| Private Services | 8,037 | 56,259 | 7 | 24,111 | 3 | 32,148 | 4 | 8,037 | 1 | 120,555 | 15 |
| Public Services | 7,236 | 108,540 | 15 | 21,708 | 3 | 0 | 0 | 0 | 0 | 130,248 | 18 |
| Other | --- | 53,288 | 8 | 0 | 0 | 0 | 0 | 25,000 | 1 | 78,288 | 9 |
| Total Non-Farm Income, All Sectors | --- | 371,894 | 46 | 175,333 | 22 | 93,264 | 12 | 46,138 | 3 | 686,629 | 83 |

1/ Transportation, construction, and utilities

Source: Southwest Research and Development Co., 1977 and BLM Socorro District Grazing Files

TABLE 2-23

ESTIMATED AVERAGE EMPLOYMENT, WAGE RATES, AND LABOR COSTS IN ONE YEAR BY RANCH SIZE, 1977

| Items | Units 1/ | Labor Per Ranch | | | |
|---|---|---|---|---|---|
| | | Subsistence Ranches | Small Ranches | Medium-Size Ranches | Large Ranches |
| Number of Operators | | 49 | 20 | 20 | 13 |
| Family | | | | | |
| Operator | Man-months | 3 | 6 | 9 | 10 |
| Other | Man-months | 1 | 1 | 3 | 4 |
| Total | Man-months | 4 | 7 | 12 | 14 |
| Hired | | | | | |
| Full-Time | | | | | |
| Amount | Man-months | 0 | 0 | 0 | 12 |
| Wage Rate | Dollars | - | - | - | 380 |
| Cost | Dollars | 0 | 0 | 0 | 4,560 |
| Seasonal | | | | | |
| Amount | Man-months | 0 | 3 | 7 | 5 |
| Wage Rate | Dollars | - | 300 | 340 | 340 |
| Cost | Dollars | 0 | 900 | 2,380 | 1,700 |
| Day | | | | | |
| Amount | Man-days | 3 | 0 | 30 | 0 |
| Wage Rate | Dollars | 17.60 | - | 21.10 | - |
| Cost | Dollars | 53 | 0 | 633 | 0 |
| Total Labor Hired | Man-months | 0.1 | 3 | 8 | 26 |
| Total Hired Labor Cost | Dollars | 53 | 900 | 3,013 | 6,260 |

1/ One man-month equals 25 man-days of labor.

Source: Southwest Research and Development Co., 1977

livestock, and acquire the necessary operating equipment. There are those, however, that are content to pursue the ranching lifestyle only on weekends. This requires less capital than full-time ranching and is actually a production-consumption lifestyle of its own (Southwest Research and Development Co., 1977).

Environmental and conservation groups are probably the other dominant interest group of the public land. Their numbers within the ES Area are very limited, but they work with State and national organizations and are very vocal. Their influence is far greater than their numbers. Conservation groups feel strongly that areas should be preserved in their natural state in order to maintain and protect wildlife and their habitats, aesthetic values, scenic quality, and recreation potential. This group supports the designation of wilderness and wildlife areas as a means to preserve wildlife and their habitats. They anticipate that the rate of exploitation of natural resources in the area will decline as conservation measures are adopted (Southwest Research and Development Co., 1977).

### *Future Environment*

The 25 existing AMP allotments would be intensively managed while the remaining allotments would continue as they are, without AMPs or livestock reductions in the ES Area. No jobs would be lost; income would increase 0.5 percent to $2,532,589; permit values would increase 0.6 percent to $18,137,700. Tables 2-24, 2-25, 2-26 and Figures A-11 through A-16 (Appendix 6, pp. A-89-91) compare the Future Environment to the Proposed Action and alternatives. The ES Area's population is expected to remain relatively unchanged (Southwest Research and Development Co., 1977).

### *Impacts*

#### INTRODUCTION

In the socio-economic section additional acreage and AUMs were included in the analysis. These additional acres (1,650,214 versus 1,318,147 acres in other resource sections) and AUMs (189,646 versus 119,465 in other resource sections) are attributed to the private and State land on the non-AMP allotments. The Proposed Action and alternatives would not have impacts on these acres and AUMs. However, it was necessary to include these additional acres and AUMs to arrive at a more valid total direct income in the entire ES Area. This allowed a more thorough analysis of impacts to the livestock operators and related services under the Proposed Action and alternatives; therefore, with the additional acres and AUMs, this section shows a 21-percent reduction in livestock AUMs in the Proposed Action rather than the 30-percent reduction in AUMs analyzed in all other resource sections of the ES. The adjustments in grazing use would be the same for each allotment but the overall average decrease from a 30-percent reduction to a 21-percent reduction would be because of the addition of acreage and AUMs where no change was proposed.

#### POPULATION AND EMPLOYMENT

Total population and employment would be only slightly affected because of the sparsely populated ES impact area. Ranch family population would not change in the short term. For each 2-percent reduction in grazing one job would be lost in the impact area. Consequently, as grazing use is reduced, unemployment would increase; on the other hand, as grazing use is increased, employment would increase (Southwest Research and Development Co., 1977). Jobs gained as a result of increased grazing use would probably not be the same jobs that were lost as a result of reductions of grazing use.

**Proposed Action** - The 21-percent reduction in grazing use would result in the loss of 10 jobs in the short term. In the long term grazing use would be approximately 2 percent above the existing situation. The same number of jobs that were lost during the short term would be regained and one new job would be created in the long term.

**No Action Alternative** - The 5-percent reduction in grazing use would eliminate approximately 2 jobs in the short term, but an equal number of jobs would be regained in the long term.

**Livestock Adjustment Alternative** - The 21-percent reduction in grazing use would result in the loss of 10 jobs in the short term. In the long term grazing use would be approximately 2 percent below the existing situation. All but one job lost during the short term would be regained in the long term.

**Pasture Capacity Level Alternative** - The 31-percent reduction in grazing use would result in the loss of 15 jobs in the short term. The long-term, 15-percent increase in grazing use above the existing situation would restore the lost jobs and create 7 new jobs. These would not be the same jobs that were lost during the reduction period.

**Enhancement of Sensitive Resource Values Alternative** - The 37-percent reduction in grazing use would result in the loss of 18 jobs in the short term. The long-term, 18-percent increase in grazing use above the existing situation would restore the lost jobs and would create 9 new jobs. These would not be the same jobs that were lost during the reduction period.

TABLE 2-24

DIRECT AND INDIRECT INCOME FROM THE RANGE LIVESTOCK INDUSTRY /1

| | EE | PA | | NA/FE | | LA | | PCL | | ESR | | NG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Short and Long Term /2 | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short & Long Term |
| Direct Income /3 | | | | | | | | | | | | |
| Cash Receipts from all grazing | 2,507,057 | 1,979,537 | 2,552,837 | 2,399,368 | 2,532,589 | 1,979,537 | 2,467,854 | 1,689,481 | 2,613,109 | 1,549,126 | 2,758,084 | 1,332,536 |
| Cash Receipts from public land grazing | 1,601,508 | 1,255,224 | 1,618,753 | 1,525,998 | 1,643,802 | 1,255,224 | 1,564,866 | 509,475 | 826,265 | 345,765 | 1,811,509 | 0 |
| Indirect Income /3 | | | | | | | | | | | | |
| Cash Receipts from all grazing | 7,956,889 | 6,282,655 | 8,076,175 | 7,615,114 | 8,037,931 | 6,282,655 | 7,832,475 | 5,362,075 | 8,293,185 | 4,916,616 | 8,753,607 | 4,229,203 |
| Cash Receipts from public land grazing | 5,082,866 | 3,983,830 | 5,137,598 | 4,843,215 | 5,217,099 | 3,983,830 | 4,966,571 | 1,616,972 | 2,622,400 | 1,097,389 | 5,749,367 | 0 |

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative

/1 Summary of Tables A-26 to A-37, in Appendix 6, pp. A-92-103, shows Estimated Receipts, Cost, and Net Returns per Ranch Size Categories for the Existing Environment and Short and Long Term for the Proposed Action and Alternatives.

/2 Existing Environment is for 1977

/3 Denotes 1975 Dollars

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE 2-25

PERMIT VALUE BY RANCH SIZE CATEGORY
(In Thousands of Dollars)

| | EE | PA | | NA/FE | | LA | | PCL | | ESR | | NG |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short & Long Term |
| SS | 315.9 | 339.3 | 378.0 | 374.4 | 339.3 | 339.3 | 364.5 | 367.2 | 257.4 | 270.0 | 234.0 | 342.0 |
| SL | 1,069.2 | 703.8 | 688.5 | 872.1 | 889.2 | 703.8 | 661.5 | 719.1 | 810.0 | 792.0 | 900.0 | 745.2 |
| SCS | 548.1 | 688.5 | 541.8 | 469.8 | 655.2 | 688.5 | 633.6 | 655.2 | 662.4 | 783.0 | 669.6 | 560.7 |
| SCM | 616.5 | 1,109.7 | 793.8 | 1,029.6 | 603.0 | 1,109.7 | 1,012.5 | 1,012.5 | 691.2 | 675.0 | 729.0 | 232.2 |
| SCL | 1,317.6 | 1,083.6 | 934.2 | 1,140.3 | 1,310.4 | 1,083.6 | 805.5 | 796.5 | 756.0 | 486.0 | 765.0 | 347.4 |
| MCS | 3,053.7 | 1,593.9 | 2,971.8 | 2,286.0 | 2,732.4 | 1,593.9 | 3,006.9 | 1,125.0 | 3,715.2 | 1,431.0 | 3,313.8 | 1,344.6 |
| MCL | 2,513.7 | 3,337.2 | 3,337.2 | 2,608.2 | 2,880.0 | 3,337.2 | 3,410.1 | 3,880.8 | 3,016.8 | 3,102.3 | 3,654.0 | 3,361.5 |
| L | 8,646.3 | 5,370.3 | 8,716.5 | 8,505.9 | 8,728.2 | 5,370.3 | 7,916.4 | 3,969.0 | 10,948.5 | 3,868.2 | 11,002.5 | 3,019.5 |
| Total Grazing | 18,081.0 | 14,226.3 | 18,361.8 | 17,286.3 | 18,137.7 | 14,226.3 | 17,811.0 | 12,525.3 | 20,857.5 | 11,407.5 | 21,267.9 | 9,953.1 |

Note: Permit value is based on $900 per AU.

EE - Existing Environment
NA/FE - No Action Alternative and Future Environment
PCL - Pasture Capacity Level Alternative
NG - No Grazing Alternative

PA - Proposed Action
LA - Livestock Adjustment Alternative
ESR - Enhancement of Sensitive Resource Values Alternative

SS = Subsistence Small
SCS = Small Commercial Small
SCL = Small Commercial Large
MCL = Medium Commercial Large

SL = Subsistence Large
SCM = Small Commercial Medium
MCS = Medium Commercial Small
L = Large

Source: BLM Socorro District Grazing Files and Federal Land Bank, Albuquerque

TABLE 2-26

OPERATORS BY RANCH SIZE CATEGORY IN THE SHORT AND LONG TERMS

| | Characteristics in EE | | Characteristics in ST | | Change From EE to ST | | Characteristics in LT | | Change From EE to LT | |
|---|---|---|---|---|---|---|---|---|---|---|
| | No. of Operators | Average No./AUs | No. of Operators | Average No./AUs | No. of Operators | Average No./AUs | No. of Operators | Average No./AUs | No. of Operators | Average No./AUs |
| Proposed Action | | | | | | | | | | |
| Subsistence Small | 27 | 13 | 29 | 13 | +2 | 0 | 27 | 15 | 0 | +2 |
| Subsistence Large | 22 | 54 | 17 | 46 | -5 | -8 | 15 | 51 | -7 | -3 |
| Small Commercial Small | 7 | 87 | 9 | 85 | +2 | -2 | 8 | 89 | +1 | +2 |
| Small Commercial Medium | 5 | 137 | 9 | 137 | +4 | 0 | 7 | 126 | +2 | -11 |
| Small Commercial Large | 8 | 183 | 7 | 172 | -1 | -11 | 6 | 173 | -2 | -10 |
| Medium Commercial Small | 13 | 261 | 7 | 253 | -6 | -8 | 13 | 254 | 0 | -7 |
| Medium Commercial Large | 7 | 399 | 9 | 412 | +2 | +13 | 9 | 412 | +2 | +13 |
| Large | 13 | 739 | 9 | 663 | -4 | -76 | 13 | 748 | 0 | +9 |
| Total | 102 | | 96 | | | | 98 | | | |
| No Action Alternative/ Future Environment | | | | | | | | | | |
| Subsistence Small | 27 | 13 | 32 | 13 | +5 | 0 | 29 | 13 | +2 | 0 |
| Subsistence Large | 22 | 54 | 19 | 51 | -3 | -3 | 19 | 52 | -3 | -2 |
| Small Commercial Small | 7 | 87 | 6 | 87 | -1 | 0 | 8 | 91 | +1 | +4 |
| Small Commercial Medium | 5 | 137 | 8 | 143 | +3 | +6 | 5 | 134 | 0 | -3 |
| Small Commercial Large | 8 | 183 | 7 | 181 | -1 | -2 | 8 | 182 | 0 | -1 |
| Medium Commercial Small | 13 | 261 | 10 | 254 | -3 | -7 | 12 | 253 | -1 | -8 |
| Medium Commercial Large | 7 | 399 | 7 | 414 | 0 | +15 | 8 | 400 | +1 | +1 |
| Large | 13 | 739 | 13 | 727 | 0 | -12 | 13 | 746 | 0 | +7 |
| Total | 102 | | 102 | | | | 102 | | | |
| Livestock Adjustments Alternative | | | | | | | | | | |
| Subsistence Small | 27 | 13 | 29 | 13 | +2 | 0 | 27 | 15 | 0 | +2 |
| Subsistence Large | 22 | 54 | 17 | 46 | -5 | -8 | 15 | 49 | -7 | -5 |
| Small Commercial Small | 7 | 87 | 9 | 85 | +2 | -2 | 8 | 88 | +1 | +1 |
| Small Commercial Medium | 5 | 137 | 9 | 137 | +4 | 0 | 9 | 125 | +4 | -12 |
| Small Commercial Large | 8 | 183 | 7 | 172 | -1 | -11 | 5 | 179 | -3 | -4 |
| Medium Commercial Small | 13 | 261 | 7 | 253 | -6 | -8 | 13 | 257 | 0 | -4 |
| Medium Commercial Large | 7 | 399 | 9 | 412 | +2 | +13 | 9 | 421 | +2 | +22 |
| Large | 13 | 739 | 9 | 663 | -4 | -76 | 12 | 733 | 0 | -6 |
| Total | 102 | | 96 | | | | 98 | | | |
| Pasture Capacity Level Alternative | | | | | | | | | | |
| Subsistence Small | 27 | 13 | 34 | 12 | +7 | -1 | 22 | 13 | -5 | 0 |
| Subsistence Large | 22 | 54 | 17 | 47 | -5 | -7 | 18 | 50 | -4 | -4 |
| Small Commercial Small | 7 | 87 | 8 | 91 | +1 | +4 | 8 | 92 | +1 | +5 |
| Small Commercial Medium | 5 | 137 | 9 | 125 | +4 | -12 | 6 | 128 | +1 | -9 |
| Small Commercial Large | 8 | 183 | 5 | 177 | -3 | -6 | 5 | 168 | -3 | -15 |
| Medium Commercial Small | 13 | 261 | 5 | 250 | -8 | -11 | 16 | 258 | +3 | -3 |
| Medium Commercial Large | 7 | 399 | 11 | 392 | +4 | -7 | 8 | 419 | -1 | +20 |
| Large | 13 | 739 | 7 | 630 | -6 | -109 | 15 | 811 | +2 | +72 |
| Total | 102 | | 96 | | | | 98 | | | |
| Enhancement of Sensitive Resource Values Alternative | | | | | | | | | | |
| Subsistence Small | 27 | 13 | 30 | 10 | +3 | -3 | 20 | 13 | -7 | 0 |
| Subsistence Large | 22 | 54 | 20 | 44 | -2 | -10 | 20 | 50 | -2 | -4 |
| Small Commercial Small | 7 | 87 | 10 | 87 | +3 | 0 | 8 | 93 | +1 | +6 |
| Small Commercial Medium | 5 | 137 | 6 | 125 | +1 | -12 | 6 | 135 | +1 | -2 |
| Small Commercial Large | 8 | 183 | 3 | 180 | -5 | -3 | 5 | 170 | -3 | -13 |
| Medium Commercial Small | 13 | 261 | 6 | 265 | -7 | +4 | 14 | 263 | +1 | +2 |
| Medium Commercial Large | 7 | 399 | 9 | 383 | +2 | -16 | 10 | 406 | +3 | +7 |
| Large | 13 | 739 | 7 | 614 | -6 | -125 | 15 | 815 | +2 | +76 |
| Total | 102 | | 91 | | | | 98 | | | |
| No Grazing Alternative | | | | | | | | | | |
| Subsistence Small | 27 | 13 | 38 | 10 | +11 | -3 | 38 | 10 | +11 | -3 |
| Subsistence Large | 22 | 54 | 18 | 46 | -4 | -8 | 18 | 46 | -4 | -8 |
| Small Commercial Small | 7 | 87 | 7 | 89 | 0 | +2 | 7 | 89 | 0 | +2 |
| Small Commercial Medium | 5 | 137 | 2 | 129 | -3 | -8 | 2 | 129 | -3 | -8 |
| Small Commercial Large | 8 | 183 | 2 | 193 | -6 | +10 | 2 | 193 | -6 | +10 |
| Medium Commercial Small | 13 | 261 | 6 | 249 | -7 | -12 | 6 | 249 | -7 | -12 |
| Medium Commercial Large | 7 | 399 | 9 | 415 | +2 | +16 | 9 | 415 | +2 | +16 |
| Large | 13 | 739 | 5 | 671 | -8 | -68 | 5 | 671 | -8 | -68 |
| Total | 102 | | 87 | | | | 87 | | | |

EE = Existing Environment
ST = Short Term
LT = Long Term

Source: BLM Socorro District Grazing Files

**No Grazing Alternative** - Twenty-two (22) jobs would be lost in the short term and not reinstated in the long term because of the 45-percent reduction in grazing use. This would result from the elimination of grazing on public land.

## INCOME

Large economic gains would not be possible from the ES Area grazing resource. Long-term increases in direct livestock income would be attributable to increased grazing use because of increased forage production. Table 2-27 shows direct income by ranch size categories.

Indirect income from livestock for the short and long terms in the impacted economy would fluctuate in conjunction with the direct income (Table 2-24); this is caused by changes in grazing use (Appendix 5, Table A-24, p. A-83).

Because operators of smaller ranches are less dependent on income derived from ranching (Table 2-22) they would be less effected by a reduction in grazing use than the operators of larger ranches. For example, an operator of a small ranch may receive only 10 percent of his total income from his ranch. If his reduction is 50 percent, it would decrease his total income about 5 percent. On the other hand, an operator of a larger ranch who earns 90 percent of his total income from ranching, receiving a 50-percent reduction, would have his total income reduced about 45 percent.

During the first two years of implementation operators would continue functioning as they presently are. Management practices would not change until all reductions have been made. Livestock production rates and variable costs during this period would probably remain constant and reflect rates typical of a particular ranch size. Further, none of the operators would suspend operations until the target level of reduction would be reached. During this period ranch operators would reduce their livestock to the adjustment level.

**Proposed Action** - In the short term after the 21-percent decrease in grazing use, direct income (Table 2-24) would be $1,979,537, a 21-percent reduction from the existing situation. In the long term, after the 2-percent increase in grazing use, direct income would be $2,552,837, a 2-percent increase from the existing situation. There would be a 29-percent increase in direct income from the short to the long term.

**No Action Alternative** - In the short term, after the 5-percent decrease in grazing use, direct income (Table 2-24) would be $2,399,368, a 4-percent reduction from the existing situation. In the long term, after the 0.6-percent increase in grazing use, direct income would be $2,532,589, a 1-percent increase from the existing situation. There would be a 6-percent increase in direct income from the short to the long term.

**Livestock Adjustment Alternative** - In the short term, after the 21-percent decrease in grazing use, direct income (Table 2-24) would be $1,979,537, a 21-percent reduction from the existing situation. In the long term, after the 2-percent decrease in grazing use, direct income would be $2,467,854, a 2-percent decrease from the existing situation. There would be a 25-percent increase in direct income from the short to the long term.

**Pasture Capacity Level Alternative** - In the short term, after the 31-percent decrease in grazing use, direct income (Table 2-24) would be $1,689,481, a 33-percent reduction from the existing situation. In the long term, after the 15-percent increase in grazing use, direct income would be $2,613,109, a 4-percent increase from the existing situation. There would be a 55-percent increase in direct income from the short to the long term.

**Enhancement of Sensitive Resource Values Alternative** - In the short term, after the 37-percent decrease in grazing use, direct income would be $1,549,126, a 38-percent reduction from the existing situation. In the long term, after an 18-percent increase in grazing use, direct income would be $2,758,084, a 10-percent increase from the existing situation. There would be a 78-percent increase in direct income from the short to the long term.

**No Grazing Alternative** - Direct income would decrease 45-percent after grazing is eliminated on public land in the short and long terms. Estimated income on non-public lands would be $1,332,536. This would be a $1,174,521 (47 percent) decrease from the existing situation (Table 2-24).

## PERMIT VALUE

As a result of the proposed livestock reductions, grazing permit values associated with public lands would decline. Reductions in current grazing permit values would cause a reduction in ranchers' equities, e.g., loan collateral and sale value. This would result in increased difficulty in obtaining real estate and intermediate term loans. Also, lenders would be more reluctant to make range development loans with a third party having an influence on the number, size, and location of range developments (Southwest Research and Development Co., 1977). As a result, some ranch operators would drop out of the livestock industry. Presently, the grazing permit value of an AU on public land averages $900 for yearlong grazing (BLM communication with James C. Harrelson, President, Federal Land Bank Association of Albuquerque).

TABLE 2-27

SUMMARY OF INCOME (DOLLARS) BY RANCH SIZE CATEGORY



| | Subsistence Small | Subsistence Large | Small Commercial Small | Small Commercial Medium | Small Commercial Large | Medium Commercial Small | Medium Commercial Large | Large | Total |
|---|---|---|---|---|---|---|---|---|---|
| Existing Environment | | | | | | | | | |
| Number of Operators | 27 | 22 | 7 | 5 | 8 | 13 | 7 | 13 | 102 |
| Average Income | 489 | 4,650 | 9,283 | 15,650 | 21,001 | 33,176 | 52,357 | 98,656 | |
| Total Income | 13,203 | 102,300 | 64,981 | 78,250 | 168,008 | 431,288 | 366,499 | 1,282,528 | 2,507,057 |
| Proposed Action | | | | | | | | | |
| Short Term | | | | | | | | | |
| Number of Operators | 29 | 17 | 9 | 9 | 7 | 7 | 9 | 9 | 96 |
| Average Income | 651 | 3,106 | 11,974 | 16,080 | 20,690 | 31,528 | 54,895 | 88,421 | |
| Total Income | 18,879 | 52,802 | 107,766 | 144,720 | 144,830 | 220,696 | 494,055 | 795,789 | 1,979,537 |
| Long Term | | | | | | | | | |
| Number of Operators | 27 | 15 | 8 | 7 | 6 | 13 | 9 | 13 | 98 |
| Average Income | 749 | 5,400 | 9,241 | 12,932 | 11,446 | 32,916 | 55,228 | 99,502 | |
| Total Income | 20,223 | 81,000 | 73,928 | 90,524 | 68,676 | 427,908 | 497,052 | 1,293,526 | 2,552,837 |
| No Action Alternative and Future Environment | | | | | | | | | |
| Short Term | | | | | | | | | |
| Number of Operators | 32 | 19 | 6 | 8 | 7 | 10 | 7 | 13 | 102 |
| Average Income | 752 | 4,018 | 8,893 | 17,225 | 21,445 | 31,586 | 54,263 | 97,076 | |
| Total Income | 24,064 | 76,342 | 53,358 | 137,800 | 150,115 | 315,860 | 379,841 | 1,261,988 | 2,399,368 |
| Long Term | | | | | | | | | |
| Number of Operators | 29 | 19 | 8 | 5 | 8 | 12 | 8 | 13 | 102 |
| Average Income | 651 | 3,978 | 11,610 | 15,342 | 21,358 | 32,359 | 51,980 | 99,502 | |
| Total Income | 18,879 | 75,582 | 92,880 | 76,710 | 170,864 | 388,308 | 415,840 | 1,293,526 | 2,532,589 |
| Livestock Adjustment Alternative | | | | | | | | | |
| Short Term | | | | | | | | | |
| Number of Operators | 29 | 17 | 9 | 9 | 7 | 7 | 9 | 9 | 96 |
| Average Income | 651 | 3,106 | 11,974 | 16,080 | 20,690 | 31,528 | 54,895 | 88,421 | |
| Total Income | 18,879 | 52,802 | 107,766 | 144,720 | 144,830 | 220,696 | 494,055 | 795,789 | 1,979,537 |
| Long Term | | | | | | | | | |
| Number of Operators | 27 | 15 | 8 | 9 | 5 | 13 | 9 | 12 | 98 |
| Average Income | 746 | 5,485 | 8,856 | 13,983 | 26,311 | 33,706 | 54,901 | 92,075 | |
| Total Income | 20,142 | 82,275 | 70,848 | 125,847 | 131,555 | 438,178 | 494,109 | 1,104,900 | 2,467,854 |
| Pasture Capacity Level Alternative | | | | | | | | | |
| Short Term | | | | | | | | | |
| Number of Operators | 34 | 17 | 8 | 9 | 5 | 5 | 11 | 7 | 96 |
| Average Income | 753 | 3,187 | 9,476 | 14,157 | 19,787 | 30,462 | 52,534 | 82,480 | |
| Total Income | 25,602 | 54,179 | 75,808 | 127,413 | 98,935 | 152,310 | 577,874 | 577,360 | 1,689,481 |
| Long Term | | | | | | | | | |
| Number of Operators | 22 | 18 | 8 | 6 | 5 | 16 | 8 | 15 | 98 |
| Average Income | 990 | 3,977 | 8,690 | 14,825 | 18,955 | 28,553 | 54,220 | 91,726 | |
| Total Income | 21,780 | 71,586 | 69,520 | 88,950 | 94,775 | 456,848 | 433,760 | 1,375,890 | 2,613,109 |

TABLE 2-27 (continued)

SUMMARY OF INCOME (DOLLARS) BY RANCH SIZE CATEGORY



| | Subsistence Small | Subsistence Large | Small Commercial Small | Small Commercial Medium | Small Commercial Large | Medium Commercial Small | Medium Commercial Large | Large | Total |
|---|---|---|---|---|---|---|---|---|---|
| Enhancement of Sensitive Resource Values Alternative | | | | | | | | | |
| Short Term | | | | | | | | | |
| Number of Operators | 30 | 20 | 10 | 6 | 3 | 6 | 9 | 7 | 91 |
| Average Income | 378 | 2,983 | 9,092 | 14,589 | 20,819 | 33,764 | 51,994 | 80,955 | |
| Total Income | 11,340 | 59,660 | 90,920 | 87,534 | 62,457 | 202,584 | 467,946 | 566,685 | 1,549,126 |
| Long Term | | | | | | | | | |
| Number of Operators | 20 | 20 | 8 | 6 | 5 | 14 | 10 | 15 | 98 |
| Average Income | 702 | 4,075 | 9,869 | 15,681 | 19,362 | 33,904 | 53,669 | 92,090 | |
| Total Income | 14,040 | 81,500 | 78,952 | 94,086 | 96,810 | 474,656 | 536,690 | 1,381,350 | 2,758,084 |
| No Grazing Alternative | | | | | | | | | |
| Short and Long Term | | | | | | | | | |
| Number of Operators | 38 | 18 | 7 | 2 | 2 | 6 | 9 | 5 | 87 |
| Average Income | 637 | 3,128 | 9,241 | 14,534 | 21,852 | 30,374 | 55,212 | 87,083 | |
| Total Income | 24,206 | 56,304 | 64,687 | 29,068 | 43,704 | 182,244 | 496,908 | 435,415 | 1,332,536 |

Source: Summary of Table 2-39 and Tables A-26-37 (Appendix 6, pp. A-92-103)

**Proposed Action** - Grazing permit values after the 21-percent decrease in grazing use in the short term is estimated at $14,226,300. This would be a $3,854,700 (21 percent) decrease from the existing situation. The long-term, 29-percent increase in permit values from the short term would be $18,361,800. This would be a 2-percent increase in permit values from the existing situation.

**No Action Alternative** - Grazing permit values after the 5-percent decrease in grazing use in the short term are estimated at $17,286,300. This would be a $794,700 (5 percent) decrease from the existing situation. The long-term, 6-percent increase in permit values from the short term would be $18,137,700. This would be a 0.6-percent increase in permit values from the existing situation.

**Livestock Adjustment Alternative** - Grazing permit values after the 21-percent decrease in grazing use in the short term are estimated at $14,226,300. This would be a $3,854,700 (21 percent) decrease from the existing situation. The long-term, 25-percent increase in permit values from the short term would be $17,811,000. This would be a 2-percent decrease in permit values from the existing situation.

**Pasture Capacity Level Alternative** - Grazing permit values after the 31-percent decrease in grazing use in the short term are estimated at $12,525,300. This would be a $5,555,700 (31 percent) decrease from the existing situation. The long-term, 66-percent increase in permit values from the short term would be $20,857,500. This would be a 15-percent increase in permit values from the existing situation.

**Enhancement of Sensitive Resource Values Alternative** - Grazing permit values after the 37-percent decrease in grazing use in the short term are estimated at $11,407,500. This would be a $6,673,500 (37 percent) decrease from the existing situation. The long-term, 86-percent increase in permit values from the short term, would be $21,267,900. This would be an 18-percent increase in permit values from the existing situation.

**No Grazing Alternative** - Grazing permit values would decrease 45 percent after grazing is eliminated on public land in the short and long term. Estimated permit values would be $9,953,100. This would be an $8,127,900 (45 percent) decrease from the existing situation.

## NUMBER OF OPERATORS AND RANCH SIZES

As a result of the reduction in grazing use under the different alternatives there would be decreases in the total number of operators in the short term. Four 100-percent public land allotments (286, 302, 311, and 357) would have their proposed grazing preference set at 0 AUMs, except in the No Action Alternative. Ranch numbers and sizes for each alternative are shown in Table 2-26. Proposed changes in grazing use by operator are shown on Table A-24 (Appendix 5, p. A-83). Also, changes in ranch categories are depicted in Figures A-11 through A-16 (Appendix 6, pp. A-89-91).

**Proposed Action** - Changes in operator numbers and ranch sizes are shown in Table 2-26. In the short term 6 subsistence small operators, which are 100-percent dependent on public land for grazing, would be reduced to 0 AUMs. Four would have grazing permanently eliminated, while 2 would have a short-term grazing use of 0 AUMs and may reenter the livestock industry in the long term as vegetative conditions improve. In the short term several operators would move to smaller ranch size categories while in the long term there would be a shift to larger ranch sizes (Figure A-11, Appendix 6, p. A-89).

**No Action Alternative** - Changes in operator numbers and ranch sizes are shown in Table 2-26. In the short term several existing AMP operators would move to small ranch size categories while in the long term there would be a shift to larger ranch sizes. The operators on the 96 non-AMP allotments would not change numbers or ranch size in the short or long term (Figure A-12, Appendix 6, p. A-89).

**Livestock Adjustment Alternative** - Changes in operator numbers and ranch sizes are shown in Table 2-26. In the short term 6 subsistence small operators, 100-percent dependent on public land for grazing, would be reduced to 0 AUMs. Four would have their grazing permanently eliminated, while 2 would have a short-term grazing use of 0 AUMs and would reenter the livestock industry in the long term as vegetative conditions improve. In the short term several operators would move to smaller ranch size categories, while in the long term there would be a shift to larger ranch sizes (Figure A-13, Appendix 6, p. A-90).

**Pasture Capacity Level Alternative** - Changes in operator numbers and ranch sizes are shown in Table 2-26. In the short term 6 subsistence small ranches, 100-percent dependent on public land for grazing, would be reduced to 0 AUMs. Four would have their grazing permanently eliminated, and 2 would have a short-term grazing use of 0 AUMs and would reenter the livestock industry in the long term as vegetative conditions improve. In the short term several ranches would move to smaller ranch size categories, while in the long term there would be a shift to larger ranch sizes (Figure A-14, Appendix 6, p. A-90).

**Enhancement of Sensitive Resource Values Alternative** - Changes in operator numbers and

ranch sizes are shown in Table 2-26. In the short term 11 ranches would be reduced to 0 AUMs. Four subsistence ranches would be permanently eliminated, and 7 ranches would have a short-term grazing use of 0 AUMs and would reenter the livestock industry in the long term as vegetative conditions improve. In the short term several ranches would move to smaller ranch size categories, while in the long term there would be a shift to larger ranch sizes (Figure A-15, Appendix 6, p. A-91).

**No Grazing Alternative** - Changes in operator numbers and ranch sizes are shown in Table 2-26. In the short and long terms fifteen (mainly subsistence small) operators would be permanently eliminated. Many operators would move to smaller ranch size categories in the short and long terms because of their dependency on public land grazing capacity (Figure A-16, Appendix 6, p. A-91).

## LIFESTYLES

Changes in lifestyles would occur as a result of changes in family income. Ranch families would be slow in adjusting to basic changes in income levels. They would attempt to earn a living or partial living from ranching; supplemental income would come from off-ranch opportunities. Lifestyles would probably not change drastically for those families with substantial off-ranch income opportunities.

Most of the larger ranchers have been earning the majority of their family incomes from ranching and would probably suffer the greatest impact in changes in lifestyles. Many of these individuals may not have the training and skills needed to move into the off-ranch labor markets. Many of these individuals have been self-employed all of their lives.

Reduced incomes would cause major changes in the standard of living for ranch families. It is anticipated that household expenditures for new equipment, new homes, home repair, and allocations of income for entertainment, travel, and both indoor and outdoor recreation would decline. Reduced cash for ranch operations would mean reductions in labor expenditures; therefore, families would perform more of the tasks associated with ranching, hiring less labor, and contracting for fewer services. In an effort to reduce food expenditures, secondary livestock enterprises for home consumption (dairy cattle, poultry, and swine) may become more popular. A renewed interest in vegetable gardening would probably occur as ranch families attempt to compensate for reduced ranch income (Southwest Research and Development Co., 1977).

There would be some increase in welfare services as unemployed ranch families, who previously may have qualified but declined participation, are forced into food stamp, health care, and income supplementing phases of the programs. Hired labor, upon release, would apply for workmen's compensation benefits.

A number of operators may be forced to lease to neighboring ranch operators. There would be an increase in hobby ranching as wealthy individuals purchase ranches in the impact area. Some of the ranchers, with uneconomical size units resulting from reductions, would probably have to seek opportunities to relocate their ranching operations (Southwest Research and Development Co., 1977). Impacts on lifestyles cannot be quantified. A qualitative assessment of changes in lifestyles would be related to changes in income. As income declines, the quality of the ranching lifestyle declines.

**Proposed Action** - As the short-term income declines 21 percent, the quality of the ranching lifestyle declines. In the long term, as income increases 29 percent from short to long term, the quality of the ranching lifestyle improves.

**No Action Alternative** - Only 29 operators included in the 25 existing AMP allotments would be affected. In the short term their income declines 36 percent, and their quality of ranching lifestyle also declines. In the long term, as their income increases 64 percent from short to long term, the quality of the ranching lifestyle would increase for the 29 operators.

**Livestock Adjustment Alternative** - As the short-term income decreases 21 percent, the quality of ranching lifestyle declines. In the long term, as income increases 25 percent from short to long term, the quality of the ranching lifestyle improves but stabilizes at a level slightly lower than under the existing situation.

**Pasture Capacity Level Alternative** - As the short-term income decreases 33 percent, the quality of the ranching lifestyle declines. In the long term, as income increases 55 percent from short to long term, the quality of the ranching lifestyle improves.

**Enhancement of Sensitive Resource Values Alternative** - As the short-term income decreases 38 percent, the quality of the ranching lifestyle declines. In the long term, as income increases 78 percent from short to long term, the quality of the ranching lifestyle improves.

**No Grazing Alternative** - Both the short- and long-term income decreases of 47 percent would decrease the quality of the ranching lifestyle.

**ATTITUDES**

The attitudes of the rancher, his family, and the people in the local communities are expected to undergo changes. AMPs involve written agreements between BLM permittees and BLM on management strategies for range livestock enterprises that include public lands. Many operators and ranch and farm organizations view AMPs as an expansion of governmental control over the management functions of operators in using private and State as well as public land. At present 25 AMPs which affect 29 operators have been implemented. The majority of these operators are in the subsistence small through the small commercial large ranch size categories. Some operators have indicated that they would go to court to fight implementation of AMPs (Southwest Research and Development Co., 1977).

A change in grazing use would result in a change in direct income and permit value. If direct income decreases, the quality of the ranching lifestyle declines; and as permit value decreases, the resale value of a ranch decreases. Both would lead to a negative attitude change by the operator toward BLM.

Increased difficulty in intergenerational transfer of ranch properties would occur as the attraction to ranching is lost (independence in decision making) and attitudes change. Several ranchers mentioned this difficulty as a major concern in interviews conducted by Southwest Research and Development Co., 1977. Heirs have indicated declining interest in ranching if AMPs are implemented.

Deteriorating relations between members of the ranching industry and BLM are expected. Operators contacting their elected governmental officials and questioning the necessity and legality of the implementation of AMPs, as well as the competency of BLM and its range management methods on public land, would be indicators of deteriorating relationships. The threat, or actual filing, of legal actions would be another indication of deteriorating relationships.

Conservationists (members of various environmental organizations as well as their sympathizers) are another group which might undergo a change of attitude, although for the better. While not being happy about the economic plight of the operators, the conservationists feel that intensive management would improve the overall character of the public lands.

A qualitative assessment of attitudes can be related to the proposed grazing use (measured in percent change). In the short term, as the proposed grazing use decreases, the attitude of the operator toward BLM would deteriorate. In the long term, as the grazing use increases, some of the negative attitudes of operators would be reversed. The attitudes of those operators forced out of business is expected to remain negative. Conservationists would maintain their positive attitude toward BLM as public lands continue to improve.

**Proposed Action** - In the short term implementation of 54 new AMPs, the modification of 19 of the 25 existing AMPs, and the 21-percent reduction in grazing use would generate a negative attitude among the operators. The 30-percent increase from short to long term in grazing use would help to reverse the negative attitude change brought on by the short-term reduction in grazing use. Four operators, whose allotments consist totally of public land, would have their grazing use permanently eliminated. These individuals would have negative attitudes in both the short and long terms.

**No Action Alternative** - In the short term the modification of 19 of the 25 existing AMPs and the 5-percent reduction in grazing use would generate a negative attitude among the operators. The 6-percent increase from short to long term in grazing use would help to reverse the negative attitude change brought on by the short-term reduction in grazing use.

**Livestock Adjustment Alternative** - In the short term the modification of 19 of the 25 existing AMPs, but mostly the 21-percent reduction in grazing use, would generate a negative attitude among the operators. The 25-percent increase from short to long term in grazing use would help to reverse the negative attitude change brought on by the short-term reductions. Four operators, whose allotments consist totally of public land, would have their grazing use permanently eliminated. These individuals would have negative attitudes in both the short and long terms.

**Pasture Capacity Level Alternative** - In the short term implementation of 54 new AMPs, the modification of 19 of the 25 existing AMPs, and the 43-percent reduction in grazing use would generate a negative attitude among the operators. In the long term the 66-percent increase from short to long term in grazing use would help to reverse the negative attitude change brought on by the short-term reductions. Four operators, whose allotments consist totally of public land, would have their grazing use permanently eliminated. These individuals would have negative attitudes in both the short and long terms.

**Enhancement of Sensitive Resource Values Alternative** - In the short term the implementation of 54 new AMPs, the modification of 19 of the 25 existing AMPs, and the 37-percent reduction in grazing use would generate a negative attitude

among the operators. The 86-percent increase from short to long term in grazing use would help to reverse the negative attitude change brought on by the short-term reductions. Four operators, whose allotments consist totally of public land, would have their grazing use permanently eliminated. These individuals would have negative attitudes in both the short and long terms.

**No Grazing Alternative** - In the short and long terms the 100-percent reduction in grazing on public land would generate a negative attitude among the operators. Fifteen operators, whose allotments consist totally of public land, would have their grazing use permanently eliminated. These individuals would have negative attitudes in both the short and long terms.

**CUMULATIVE IMPACTS**

**Proposed Action** - The same number of jobs (10) lost in the short term would be regained and one new job would be created in the long term. There would be a 2-percent increase in the long term in direct income from the existing situation. There would be a 2-percent increase in the long term in permit values from the existing situation. Four operators would have their grazing use permanently eliminated. There would be a shift to larger ranch sizes from short to long term. The quality of the ranching lifestyle would increase from the short to the long term. The increase in grazing use in the long term would help to reverse the negative attitude changes brought on by the short-term reductions.

**No Action Alternative** - The same number of jobs (2) lost in the short term would be regained in the long term. There would be a 0.6-percent increase in the long term in direct income from the existing situation. There would be a 0.6-percent increase in the long term in permit values from the existing situation. There would be a shift to larger ranch sizes from the short to long term within the 25 existing AMPs; there would be no changes on the 96 non-AMP allotments. The quality of the ranching lifestyle would increase from short to long term for the operators on the 25 existing AMPs. The increase in grazing use in the long term on the existing AMPs would help to reverse the negative attitude change brought on by the short-term reductions.

**Livestock Adjustment Alternative** - The same number of jobs (10) lost during the short term would be regained in the long term. There would be 2-percent less direct income in the long term than in the existing situation. Permit values would be 2-percent less in the long term than in the existing situation. Four operators would have their grazing use permanently eliminated. There would be a shift to larger ranch sizes from the short to long term. The quality of the ranching lifestyle would improve from short to long term. There would be a reversal in the long term of some of the negative attitude changes brought on by the short-term livestock reductions.

**Pasture Capacity Level Alternative** - The 15 jobs lost in the short term would be regained and 7 new jobs would be created in the long term. There would be a 4-percent increase in the long term indirect income from the existing situation. Permit values would increase 15 percent in the long term over the existing situation. Four operators would have their grazing use permanently eliminated. There would be a shift to larger ranch sizes from the short to long term. There would be an improvement in the quality of the ranching lifestyle from short to long term. The increase in grazing use in the long term would help reverse the negative attitude changes brought on by the short-term reductions.

**Enhancement of Sensitive Resource Values Alternative** - The 18 jobs lost in the short term would be regained and 9 new jobs would be created in the long term. There would be a 10-percent increase in the long term in direct income from the existing situation. Permit values would increase 18 percent in the long term from the existing situation. Four operators would have their grazing use permanently eliminated. There would be a shift to larger ranch sizes from the short to long term. The quality of the ranching lifestyle would improve from short to long term. The increase in grazing use in the long term would help to reverse the negative attitude changes brought on by the short-term reductions.

**No Grazing Alternative** - Twenty-two (22) jobs would be permanently lost. There would be a 45-percent decrease in direct income from the existing situation. There would be a 45-percent decrease in permit values from the existing situation. Fifteen operators would have their grazing use permanently eliminated. Many operators would move to smaller ranch size categories. There would be a decline in the quality of the ranching lifestyle. A negative attitude would be generated among the operators.

***Unavoidable Adverse Impacts***

**Proposed Action** - There would be a loss of $527,520 of direct income in the short term. Permit value would decrease $3,854,700 in the short term. Four operators would have their grazing use permanently eliminated.

**No Action Alternative** - There would be a loss of $107,689 of direct income in the short term. Permit value would decrease $794,700 in the short term.

**Livestock Adjustment Alternative** - There would be a loss of $527,520 of direct income in the short term and $39,203 in the long term. Permit value would decrease $3,854,700 in the short term and $270,000 in the long term. Four operators would have their grazing use permanently eliminated.

**Pasture Capacity Level Alternative** - There would be a loss of $817,576 of direct income in the short term. Permit value would decrease $5,555,700 in the short term. Four operators would have their grazing use permanently eliminated.

**Enhancement of Sensitive Resource Values Alternative** - There would be a loss of $957,931 of direct income in the short term. Permit value would decrease $6,673,500 in the short term. Four operators would have their grazing use permanently eliminated.

**No Grazing Alternative** - There would be a loss of $1,174,521 in the short and long terms. Permit value would decrease $8,127,900 in the short and long terms. No operators would be allowed to graze on public land. Fifteen operators would have their grazing use permanently eliminated.

## WILDLIFE

### *Existing Environment*

#### BIG GAME

Four species of big game (mule deer, pronghorn antelope, mountain lion, and black bear) occur within the area. Mountain lion and black bear occur only occasionally and are not expected to be impacted.

*Deer*

The ES Area is thinly populated with deer, with most of the area having a density of 0.25 to 0.75 deer per section. One area, Ladron Mountain, has a deer density of about 2.5 deer per section. The ES Area when compared with bordering areas having a density of one to six deer per section is relatively marginal deer habitat. The deer use this habitat year-round with no well defined winter ranges. According to the New Mexico Department of Game and Fish (NMDG&F) the current deer population in 1977 in the ES Area was stable to decreasing at about 1,333 deer. The exact cause of the population status is not known. Over harvesting, poaching, predation, livestock competition, and lack of water are factors that may be affecting the deer population. The distribution and status of deer is shown on Map 2-7.

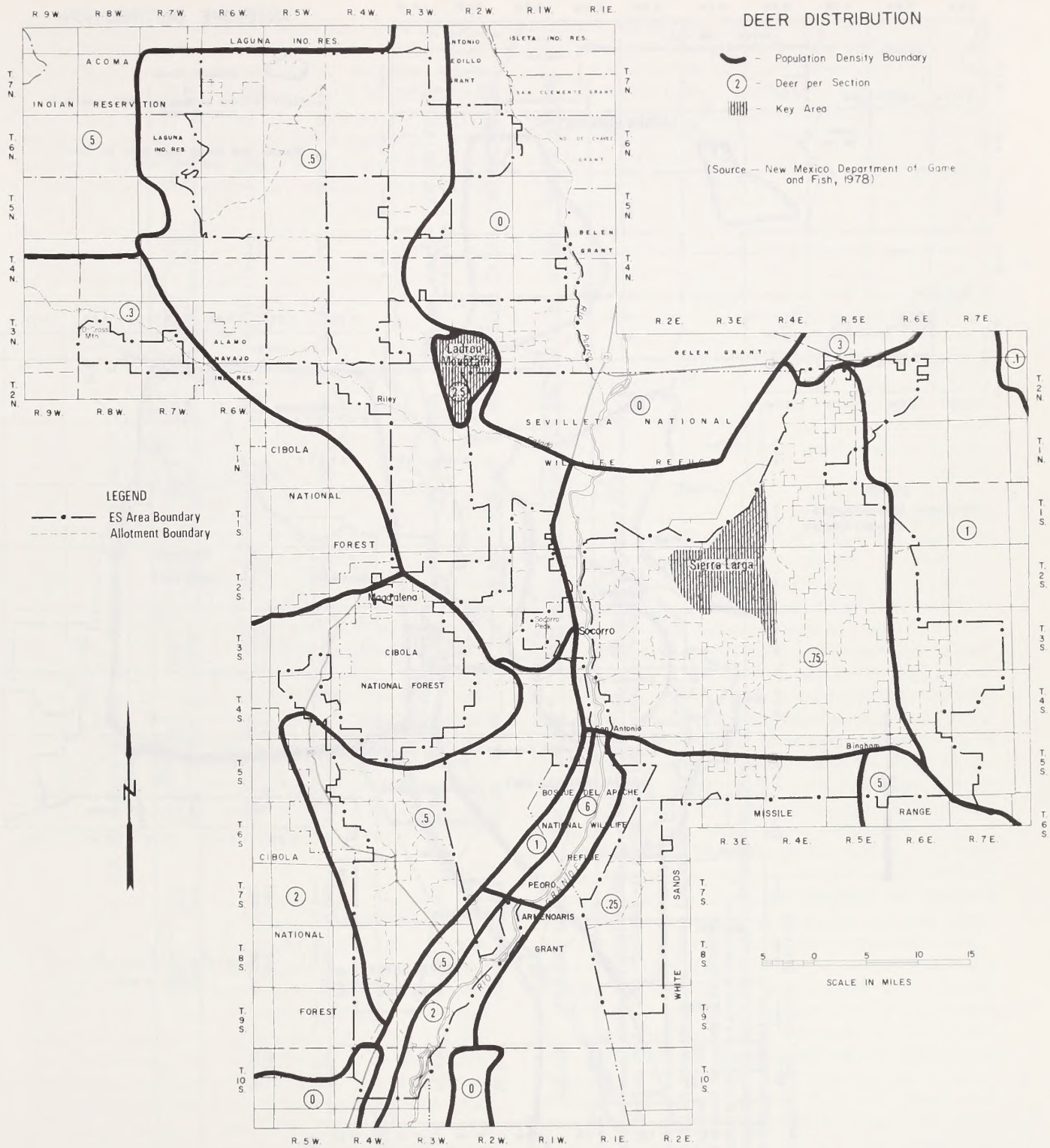
Two important areas for deer within the ES Area are Ladron Mountain (10,240 acres) and Sierra Larga (130,000 acres). Ladron Mountain has the highest deer density on public land in the ES Area. Twenty-five (25) deer pellet transects read during a study by Sutcliffe (1972) indicated the deer population on the Mountain was 2.3 plus or minus 1.3 deer per section. This figure compares to 2.7 deer per section estimated by BLM studies. Based on 2.5 deer per section, the estimated current deer population on Ladron Mountain is 40. A large portion of the Mountain is inaccesible to livestock. The forage conditions on the Mountain are good. Browse transects, read annually by BLM personnel, have shown light utilization (primarily mountain mahogany, apache-plume, rhus, and oak). The deer population on Ladron Mountain has declined from moderate to low. More research is needed to determine the reason for this decline.

Sierra Larga receives the heaviest hunting pressure and may have the largest number of deer on public land in the ES Area. NMDG&F estimates the area to have 0.75 deer per section or 150 to 160 deer total. NMDG&F estimates that the deer herd in this area has declined about 30 percent in the last 5 years. Browse transects, read annually, have shown a moderate utilization of the mountain mahogany.

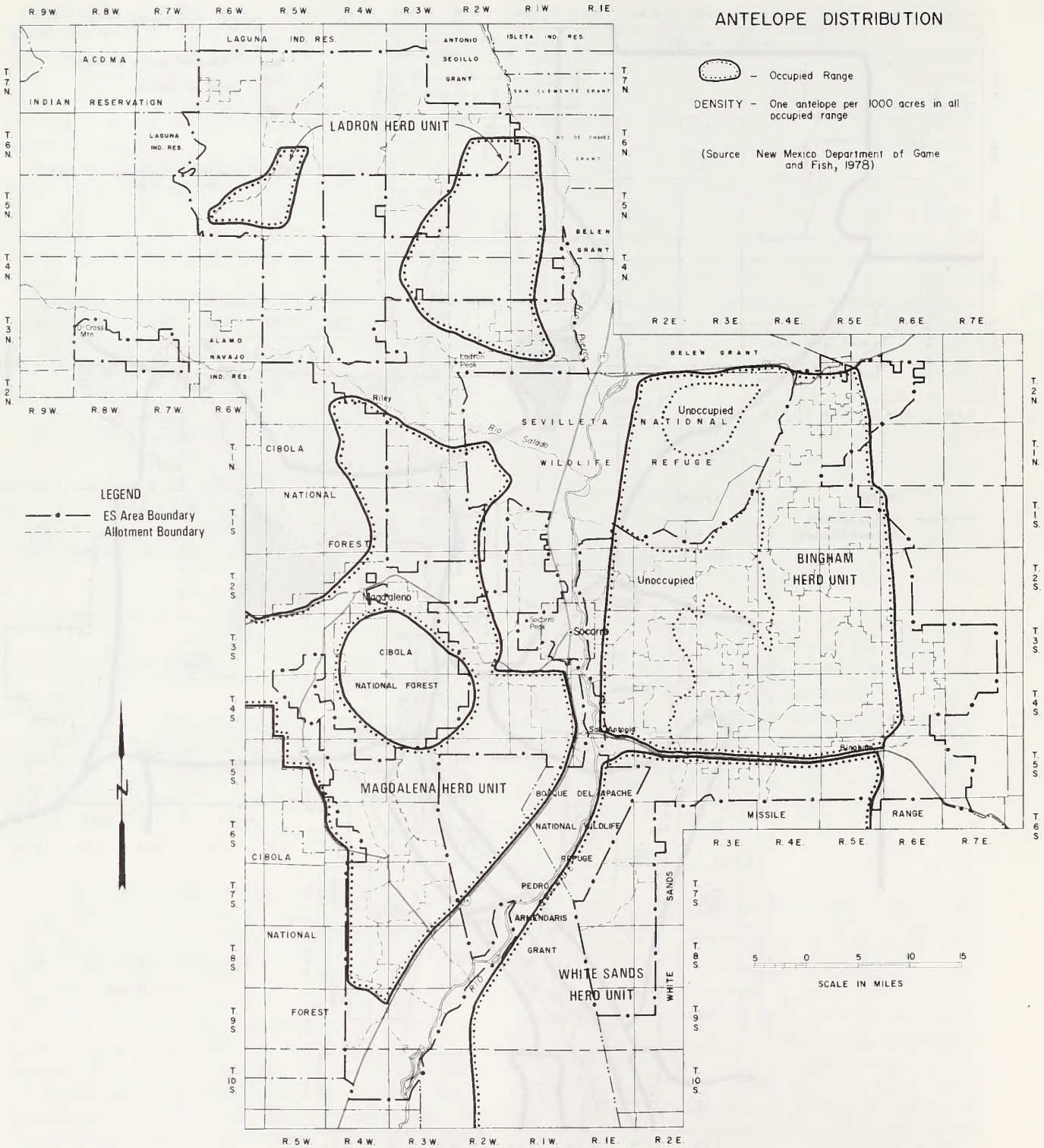
Browse (mountain mahogany, pinyon pine, juniper, rhus, and oak) make up the major portion of the deer's diet. Diet studies have shown that mountain mahogany has the highest use. The rest of their diet is made up of forbs (primarily globe mallow and bladderpod) and grasses. Although forbs do not provide a majority of the diet of deer, Urness, Green, and Watkins (1971) found them important in raising the nutrient quality of the deer's diet.

*Antelope*

The ES Area is included in four NMDG&F Antelope Herd Units. Two units, the Magdalena and Ladron, are completely within the ES Area. The other two units, White Sands and Bingham, have 10 and 99 percent of their area in the ES Area, respectively (Map 2-8). Using the maximum estimate of one antelope per 1,000 acres of suitable habitat, there is an estimated 648 antelope in the ES Area (Table 2-28). Their numbers have been stable over most of the area with an estimated 30-percent increase in the past 5 years only in the Magdalena Antelope Herd Unit (NMDG&F, 1977). The major increase in the Magdalena Antelope Herd Unit appears to have been in 1973 when there was unusually high precipitation. More intensive study is needed to determine what factors are limiting antelope numbers in other parts of the ES Area.




**MAP 2-7.** Deer Distribution




**MAP 2-8. Antelope Distribution**

TABLE 2-28

OEER ANO ANTELOPE NUMBERS, AUMs, ANO ACRES OF RESTEO HABITAT

| | EE | PA | | NA/FE | | LA | | PCL | | ESR | | NG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term | Short Term | Long Term |
| Numbers /1 | | | | | | | | | | | | | |
| Deer | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 | 1,333 |
| Antelope | 648 | 648 | 763 | 648 | 665 | 648 | 712 | 648 | 773 | 648 | 779 | 648 | 720 |
| TOTAL APPORTIONEO AUMs | 1,903 | 4,802 | 5,041 | 2,362 | 2,394 | 4,802 | 4,893 | 4,802 | 5,057 | 5,018 | 5,287 | 79,237 | 138,914 |
| Rested Habitat (Acres) /2 | | | | | | | | | | | | | |
| Deer-winter rested | 17,458 | 95,101 | 95,101 | 24,985 | 24,985 | 24,985 | 24,985 | 95,101 | 95,101 | 112,151 | 115,107 | 217,673 | 217,673 |
| Antelope-spring rested | 26,848 | 212,568 | 212,568 | 49,728 | 49,728 | 49,728 | 49,728 | 212,568 | 212,568 | 235,615 | 212,568 | 459,050 | 459,050 |
| Minimum Rested at any one time | 100,210 | 315,239 | 315,239 | 108,053 | 108,053 | 108,053 | 108,053 | 315,239 | 315,239 | 533,430 | 337,525 | 838,808 | 838,808 |

/1 Oeer and antelope numbers and wildlife AUMs by allotment are filed in the Socorro Oistrict Files.
/2 Acres of habitat rested from livestock use during important periods for wildlife.

EE - Existing Evironment
NA/FE - No Action Alternative and Future Environment
PA - Proposed Action
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Aternative

Source: Proposed AMPs, Socorro Oistrict

The fawn-doe ratio can be considered an index of the antelope population status. A low fawn-doe ratio may be a result of some limiting factors such as precipitation, predation, competition, poor vegetation, and/or water. Studies concerning fetus-doe ratios among antelope indicate that a fawn-doe ratio of 200:100 can be considered the potential maximum ratio (Beale and Smith, 1970). The fawn-doe ratio surveyed in the ES Area has varied from 18:100 in 1974 to 55:100 in 1975, with an average of 43:100 (NMDG&F aerial surveys). Beale and Smith (1970) found a correlation between size of fawn crop and precipition for the 4-month period of June through September. The higher precipitation rate increased fawn survival through increased vegetative production. The increased vegetative production would provide more forage and better cover (shrubs 9- to 18-inches high) for fawns. Poor forage conditions may increase losses from predation through reduced cover.

Forbs and browse make up the majority (80 to 95 percent) of the forage consumed by antelope (Russell, 1964 and BLM Fecal Study, 1977). The remainder of the diet is made up of grasses. A diet study of antelope within the ES Area in the spring of 1977 showed a varied use of forbs and browse. Fecal samples collected from the Jornada Plains, covered by a short-grass vegetative type, showed an antelope diet of about 71.54-percent browse, 28.00-percent forbs, and 0.37-percent grass. A similar sample collected at the same time in a creosote vegetative type showed the antelope's diet of 94.69-percent forbs, 4.61-percent browse, and 0.70-percent grass. It would appear that browse and forbs are utilized in relationship to their availability. Forbs are important to antelope in both sample areas during the spring and summer. They provide a good source of nutrients to does and fawns during a critical fawning period. Forbs are also eaten to some extent in the winter.

With the exception of 30 miles of woven wire boundary fence on the Huning Ranch, existing fences in the ES Area do not appear to materially interfere with antelope movement. The Huning Ranch boundary fence is a barrier to antelope movement in the Ladron Antelope Herd Unit. This fence is on private land. Three miles of woven wire fence, south of the Huning Ranch on public land, may be a problem if antelope expand into this area.

*Competition*

Forage competition between livestock and deer and antelope varies by season, location, and species. This is caused by related differences in feeding habits and management practices. Direct competition between deer and livestock is normally highest during the winter when both are using mountain mahogany. Heavy grazing by livestock in areas containing winter browse reduces food availability for deer.

When forbs are available, both livestock and deer will compete for them. Competition between deer and livestock is more severe in overgrazed areas where livestock is forced to make more use of browse and forbs.

The livestock-antelope competition would appear to be greatest in spring and summer before the grasses start growing. This period is a critical time for antelope as the does need high quality food to support their young. Both livestock and antelope make extensive use of the first new growth in the spring.

## SMALL MAMMALS

Lists of species of small mammals found in the ES Area are in the Ladron and Stallion Unit Resource Analyses (URAs). Each habitat type supports a diversity of species and varying populations and density of small mammals. Wood (1969) noted that the black grama climax habitat type supported a low rodent population with a mean density of 0.64 per acre. The four-wing saltbush-mesquite habitat type supported a large rodent population with a mean density of 2.63 per acre. Short-grass habitat types are preferred by jackrabbits, while cottontails prefer brushier cover. The lowest vegetative successional stages appeared to support the greatest number of small mammal species. As the successional stages approached climax, the numbers of animals and species present decreased; the species composition changed to include more insectivores and less herbivores.

## BIRDS

*Upland Game Birds*

Scaled quail and Gambel's quail are found in the ES Area. Quail populations are subject to violent annual fluctuation and seasonal cycles (Campbell, Martin, Ferovich, and Harris, 1973). The annual quail population is variable with an estimated low of less than one bird per section in dry years to as many as 70 birds per section in extra wet years. Grasses are of relatively little value as quail food, particularly those in the grama group (*Bouteloua*). Water requirements are minimal; quail can survive long periods without drinking. Water locations, however, do have a considerable influence on quail distribution. Quail tend to concentrate around water sources in the fall and winter. Quail also require protective cover as concealment from predators, as sites for nesting, and as shelter from adverse weather. Quail require all

habitat components to be within relatively close proximity (within the same 50 acres).

Gambel's quail are found most frequently along the Rio Grande bottom lands, especially in the transition areas where the rolling hills drop off into the flat river bottoms. Away from the river Gambel's quail may be found in bottoms of arroyos where cottonwood, saltcedar, Russian olive, mesquite, and screwbean provide habitat. During moist years the Gambel's quail also use the creosote vegetative type.

Most of the area is considered to be scaled quail habitat, although the actually occupied range is limited. Scaled quail have relatively restricted habitats. Their food consists primarily of large seeds from annual and perennial forbs, such as dove weed, Russian thistle, and pigweed. Seeds from some species of brush are also eaten when available. Approximately 5 to 10 percent of their diet consists of insects, which are particularly important in providing protein for young quail.

Mourning dove are present in the ES Area year-round. They are most abundant, however, in the summer and fall. Although the species may be found on all habitat types, the highest concentrations occur near water and seed-bearing vegetation. Although the dove population or habitat has not been intensively surveyed, the ES Area appears to have fair to good habitat. Based on statewide dove populations, the area is probably used by more than 318,000 dove annually (calculated from Huey, 1967). This estimate includes individuals which only occasionally use the area or are passing through during their seasonal migration. The Bosque area along the Rio Grande is an important concentration area for dove, because it provides excellent nesting and roosting cover.

*Raptors*

The ES Area provides a wintering area for a variety of raptors. Bald eagles and golden eagles frequently migrate or winter here. Bald eagles migrate through and winter at the Elephant Butte Marsh. Nesting golden eagles, red-tailed hawks, Swainson's hawks, and prairie falcons have been observed (BLM Socorro District files). Studies on prairie habitats have shown that raptors concentrate and nest in areas with a dense amount of rodents and other small mammals (Howard and Wolf, 1976).

*Other Birds*

Other birds found in the ES Area and their preferred vegetative type are listed in the Ladron and Stallion URAs. Since they are highly mobile and commonly migratory, many of the species listed are only temporary residents. Many species that have a rare occurrence in the area are not listed. The highest density of birds in the area is supported by riparian areas (Carothers, 1977). These areas, although frequently dry, provide an important source of food and cover for birds.

## THREATENED OR ENDANGERED SPECIES

There are thirteen endangered species that have occurred or may occur within the ES Area. The species and their classification are listed in Table 2-29. Six of these species have or may find suitable habitat on BLM administered land.

The little blue heron and Olivaceous cormorant occur on BLM administered land at Elephant Butte Marsh. The Elephant Butte Marsh is one of the few wetlands remaining in the Rio Grande Valley. The Marsh is on BR land; 680 acres of the 800-acre Marsh is under cooperative agreement with BLM for wildlife management. The rookery of colony nesting water birds consists of Olivaceous cormorants, doublecrested cormorants, great egrets, snowy egrets, cattle egrets, and black-crowned night herons. This area is unique to the State. These birds nest in inundated willows, cottonwoods, and saltcedars (Hundertmark, 1975). They obtain most of their food from the Marsh and the nearby Elephant Butte Reservoir. BLM currently has a Habitat Management Plan on the Marsh.

The bald eagle and peregrine falcon are found near water but are not restricted to the Rio Grande Valley. Two or three bald eagles frequently winter at the Elephant Butte Marsh. There are no recorded summer observations of these species in the ES Area. There is no known observation of the peregrine falcon on public land in the ES Area. The Baird's sparrow is present in the State only during migration. It nests in the north and winters in Mexico. The sparrow prefers grassland with a dense stand of grass for cover.

There are no recorded sightings of the black-footed ferret, the only endangered mammal that may occur in the ES Area. Ferrets may be found in and around prairie dog towns; there they find food and shelter. There are seven prairie dog towns that have been recorded in the ES Area. None of the prairie dog towns have been studied to determine if the black-footed ferret is present.

## UNIQUE RIPARIAN AREAS

There are six perennial stream reaches, several perennial springs, and one marsh (800 acres) in the ES Area. Each of the stream reaches is less than four miles long. The Rio Salado and Mesa Carrizo are the only two streams that occur at least partly on public land. Elephant Butte Marsh is on BR land. The Marsh supports a flora and fauna which distinguishes it from any other area in New Mexico (Hundertmark, 1973). Some of these

TABLE 2-29

ENDANGERED ANIMAL SPECIES

| Classification | Common Name | Scientific Name | Habitat Type | Habitat on Public Land |
|---|---|---|---|---|
| Federal Endangered | Black-Footed Ferret | Mustela nigripes | Prairie dog town | Yes |
| Federal Endangered | Whooping Crane | Grus americana | Rio Grande Valley | No |
| Federal Endangered | Bald Eagle | Haliaeetus leucocephalus | Large trees on cliffs near water - Elephant Butte Marsh | Yes |
| Federal Endangered | Peregrine Falcon | Falco peregrinus | Large cliffs near water | Yes |
| Federal Endangered | Socorro Isopod | Exosphaeroma thermophilum | Hot spring | No |
| State Endangered (Group I) | Little Blue Heron | Florida caerulea | Rio Grand Valley | Yes |
| State Endangered (Group II) | Olivaceous Cormorant | Phalacrocorax olivaceus | Elephant Butte Reservoir | Yes |
| State Endangered (Group II) | Least Tern | Sterna albifrons athalassos | Rio Grande Valley | No |
| State Endangered (Group II) | Mississippi Kite | Ictinia misisippiensis | Tall trees in Rio Grande Valley | No |
| State Endangered (Group II) | Bell's Vireo | Vireo bellii | Riparian mesquite, cottonwood willow association | No |
| State Endangered (Group II) | Baird's sparrow | Ammodramus bairdii | Dense grass in grassland | Yes |
| State Endangered (Group II) | Osprey | Pandion haliaetus carolinensis | Open water with fish | No |
| State Endangered (Group II) | Red-Headed Woodpecker | Melanerpes erythrocephalus | Large cottonwoods in Rio Grande Valley | No |

Sources: Federal Register, Thursday, July 14, 1977, Part V; and Endangered Species Handbook for New Mexico, 1978.

fauna are endangered species (Table 2-29). The unique riparian areas within the ES Area are summarized in the Vegetation Section in Table 2-4.

## AQUATIC HABITAT

The ES Area includes two riparian areas, Ponia Creek and Elephant Butte Marsh, with sufficient water quality to support fish. Ponia Creek flows from a spring down a canyon on private land for about one mile. The creek supports a small population of flathead minnows and Rio Grande chubs. The Elephant Butte Marsh, with a fluctuating water level of about 800 surface acres, supports a large population of channel catfish, largemouth bass, shad, and carp. The livestock utilization of vegetation around these areas varies from slight to moderate for Ponia Creek and slight to heavy for the Elephant Butte Marsh.

### *Future Environment*

On the 25 existing AMPs the improved habitat would maintain deer numbers, while increasing antelope numbers by 17 for a total of 665 antelope. Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. The change in numbers of small mammals cannot be quantified.

Wildlife habitat is not expected to change on the 96 non-AMP allotments. Deer population trends in the ES Area are unknown; therefore, future predictions are not possible. Antelope, with the exception of the Magdalena Antelope Herd Unit, would be expected to follow the stable trend of the last 5 years. The Magdalena Antelope Herd Unit would be expected to continue increasing but at a slower rate than the 30-percent increase for the last 5 years. Rodents would maintain their present high numbers.

### *Impacts*

## BIG GAME

Human activity and noise associated with construction would displace deer and antelope from the immediate area. Both deer and antelope would return to the area after construction activities were completed. This would be a short-term, local impact.

New fences would create temporary barriers to free movement. Fences, even when built to allow wildlife movement, constitute a barrier until animals learn to negotiate them. Even then, fences would serve as a barrier to rapid movement. This would be more severe for antelope than for deer because antelope must go under or through a fence while deer jump over. The presence of maintenance and temporary roads would provide access to areas which are presently undisturbed by human activity and would result in increased disturbance, harassment, and poaching activities. The disturbance and harassment of deer would alter use patterns. This would be a long-term, local impact.

The construction of new water developments would help provide the optimum water requirements of 2 to 3 quarts per day per hundred weight for deer and 3 quarts per day for antelope (Valentine, 1971). This would expand deer and antelope range where lack of water is a limiting factor. This would be a long-term, local impact.

The improvement in vegetative production over the existing level resulting from the livestock adjustments and grazing systems would benefit deer and antelope by increasing forage production and cover. The increased forage would provide better quality and quantity of food for deer and antelope. The increased cover would reduce predation, particularly on antelope fawns. This would be a long-term, area-wide impact.

The improved vegetation, livestock adjustments, apportionment of wildlife AUMs, and grazing systems would reduce livestock/wildlife competition. Improved vegetation would reduce competition by providing more forage for both livestock and wildlife. The livestock adjustments would reduce competition by lowering the numbers of livestock present to compete with deer and antelope. The apportionment of forage to livestock and wildlife would reduce competition by assuring sufficient forage for deer and antelope. These would be long-term, area-wide impacts.

The implementation of grazing systems would concentrate livestock in use pastures while deferring other pastures from livestock grazing. Deferred pastures would provide deer and antelope with cover and forage without competition from livestock. Because deer tend to avoid areas occupied by large concentrations of cattle (Dusek, 1975), they would shift to deferred pastures or to areas inaccessible to livestock. Scheduled winter deferment of deer habitat would remove livestock competition for browse in these pastures. Antelope doe movement is limited during their critical fawning period of 2 to 3 weeks in April and May by the relative immobility of the young. If livestock are grazed in the same pastures, it would result in reduced quality forage available to nursing does. This, in turn, would result in possible fawn mortality and malnutrition and decline in health of nursing does. Scheduled spring deferment of antelope habitat would remove livestock competition in these pastures. The competition between livestock and deer and antelope would be greatest during the initial implementation of the grazing system. The competition would decrease as wildlife learn to use deferred pastures and as forage

production increases. This would be a long-term, area-wide impact.

Increased water availability, improved quality and quantity of forage, and reduced livestock competition would allow an improvement in the habitat of deer and antelope and an increase in antelope numbers. Deer habitat, although slightly improved, would still be marginal and deer numbers are not predicted to significantly increase. The Ladron Antelope Herd Unit has been designated by the NMDG&F as being low producing. The low production of young plus marginal habitat would limit the amount of increase possible in this area.

**Proposed Action** - The construction disturbance on 580 acres would displace large mammals from the area for the duration of the construction activity. Three hundred and three (303) miles of maintenance and temporary roads would displace deer and antelope from the immediate area as long as the road is used. The addition of 214 miles of fence would limit deer and antelope mobility. The development of 79 troughs, 48 wildlife waters, 4 springs, and 1 earthen reservoir would increase water availability for deer and antelope.

Livestock/wildlife competition in the ES Area would be reduced through the 37-percent improved vegetation, 30-percent livestock reduction (from 170,697 to 119,465 AUMs), apportionment of 4,802 AUMs to deer and antelope, and grazing systems. A total of 4,601 AUMs would be apportioned for deer and antelope on elimination of grazing, unallotted, and AMP allotments. An additional 201 AUMs would be apportioned on non-AMP allotments. Appendix 1, Table A-1, p. A-1, shows the AUMs apportioned to deer and antelope on each allotment. This assured availability of forage would reduce competition and improve deer and antelope habitat.

Implementation of grazing systems would defer about 315,239 acres of public land (approximately 35 to 40 percent) in the ES Area at a time. This would reduce livestock/wildlife competition. Winter deferment of a minimum of 95,101 acres of deer habitat and spring deferment of a minimum of 212,568 acres of antelope habitat would further reduce competition between these species and livestock. The competition would be further reduced by the elimination of grazing on 1,987 acres, 1,612 acres of which is occupied by deer or antelope.

The increased water availability, improved quality and quantity of forage, and reduced livestock/wildlife competition would improve deer and antelope habitat. The improved habitat would probably stabilize deer numbers at 1,333. NMDG&F does not predict an increase in deer numbers. Antelope numbers in the Magdalena, White Sands, and Bingham Antelope Herd Units are expected to increase an additional 20 percent in the long term. Improved habitat would allow for an increase in antelope numbers from 533 to about 636 antelope in the long term. The improved habitat would provide for a possible 10-percent increase in antelope numbers in the Ladron Antelope Herd Unit, from 115 to 127 antelope in the long term. There would be a total population of 763 antelope in the long term. The methodology for predicting the antelope increases is presented in Appendix 1, p. A-15.

**No Action Alternative** - The construction of range developments on the 25 existing AMPs would displace deer and antelope on 90 acres for the duration of the construction activity. Thirty-one (31) miles of maintenance and temporary roads would displace deer and antelope from the immediate area as long as the road is used. The addition of 14 miles of fences would limit mobility of deer and antelope. The 28 water developments would improve water availability for deer and antelope. There would be no construction of range developments on the 96 non-AMP allotments and two unallotted areas.

The 7-percent livestock adjustment, the apportionment of an additional 1,027 AUMs, and intensified management on the 25 existing AMP allotments would reduce livestock competition and provide an increase in quality and quantity of forage for deer and antelope. The grazing systems would further benefit big game through the resting of 108,053 acres at a time, with winter rest of 24,985 acres of deer habitat and spring rest of 49,728 acres of antelope habitat. Deer numbers would not be expected to increase. Antelope numbers would increase 17 for a total increase from 648 to 665 animals over the ES Area. The continuation of the present management on 96 non-AMP allotments would not change the existing deer or antelope habitat.

**Livestock Adjustment Alternative** - The construction of range developments on the 25 existing AMPs would displace deer and antelope on 90 acres for the duration of the construction activity. Thirty-one (31) miles of maintenance and temporary roads would displace deer and antelope from the immediate area as long as the road is used. The addition of 14 miles of fences would limit mobility of deer and antelope. The 28 water developments would improve water availability for deer and antelope. There would be no construction of range developments on the 96 non-AMP allotments and two unallotted areas.

The 30-percent improved vegetation would improve deer and antelope habitat by increasing cover and forage. The livestock/wildlife competition would be reduced through the 30-percent im-

proved vegetation, the 30-percent livestock reduction (from 170,697 to 119,465 AUMs), and apportionment of 4,802 AUMs for deer and antelope. Livestock/wildlife competition would be further reduced on 25 existing AMP allotments with the implementation of grazing systems. The resting of a minimum of 108,053 acres in the ES Area at any time, including winter deferment of 24,985 acres of deer habitat and spring deferment of 49,728 acres of antelope habitat, would reduce competition. The improved vegetation and reduced competition would improve the condition of deer habitat and increase antelope numbers. Antelope numbers in all areas except the Ladron Antelope Herd Unit would be expected to increase 60 to 70 animals in the long term for a total of 712 animals.

**Pasture Capacity Level Alternative** - The construction disturbance on 580 acres and the use of 303 miles of maintenance and temporary roads would displace deer and antelope from the immediate area. The construction of 214 miles of fences would limit deer and antelope movement. The development of 79 troughs, 48 wildlife waters, 4 springs, and 1 earthen reservoir would improve deer and antelope habitat by increased water availability.

The 61-percent improved vegetation would improve deer and antelope habitat by increasing cover and forage. The livestock/wildlife competition would be reduced through the improved vegetation, 43-percent livestock reduction (from 170,697 to 97,036 AUMs), and apportionment of 4,802 AUMs to deer and antelope. Livestock/wildlife competition would be further reduced due to the resting of 315,239 acres at any given time, including the winter rest of 95,101 acres of deer habitat and the spring rest of 212,568 acres of antelope habitat. Competition would be further reduced by the elimination of grazing on 1,987 acres, 1,612 acres of which is occupied by deer and antelope.

Improved wildlife habitat is not expected to affect deer numbers. Antelope numbers in all areas except the Ladron Antelope Herd Unit are expected to increase 110 to 120 additional animals in the long term. The Ladron Antelope Herd Unit is expected to increase 10 to 14 new animals. The total number of antelope is expected to be 773 animals.

**Enhancement of Sensitive Resource Values Alternative** - The construction disturbance on 607 acres and the use of 330 miles of maintenance and temporary roads would displace deer and antelope from the immediate area. The addition of 241 miles of fences would limit deer and antelope mobility. The development of 79 troughs, 48 wildlife waters, 4 springs, and 1 earthen reservoir would improve water availability for deer and antelope.

The 64-percent improved vegetation would improve deer and antelope habitat by increasing cover and forage. The livestock/wildlife competition would be reduced through the improved vegetation, 52-percent livestock reduction (from 170,697 to 81,901 AUMs), apportionment of 5,018 AUMs to deer and antelope, and elimination of grazing on 218,191 acres in the short term and 22,286 acres in the long term. Livestock/wildlife competition would be further reduced as a result of the implementation of grazing systems and the resting of 533,430 acres at any given time. This includes a winter rest of 95,101 acres of deer habitat and a spring rest of 235,615 acres of antelope habitat.

Reduced livestock/wildlife competition would improve deer and antelope habitat. Deer numbers are not expected to change. Antelope numbers are expected to increase 10 to 14 animals in the Ladron Antelope Herd Unit and 115 to 125 animals in the remainder of the ES Area. Antelope numbers would total 779 animals in the long term.

**No Grazing Alternative** - There would be no construction of range developments on the 838,808 acres of public land. Existing fences on public land would not be maintained or may be removed. This would improve the habitat by removing barriers to deer and antelope movement. The addition of 1,475 miles of fences and temporary roads would impact an estimated 1,475 acres of non-public land. Because the 1,475 miles of fences on non-public land may not be constructed to BLM fence specifications, they could seriously hinder deer and antelope movement. This barrier could reduce available habitat to deer and particularly antelope with a possible elimination of these animals in certain areas.

The removal of livestock from public land would allow the vegetation to improve which would improve deer and antelope habitat. As the vegetation approaches climax, with a corresponding decrease in forbs and browse, the deer and antelope habitat is expected to stabilize or possibly decline slightly. The removal of livestock would leave all of the 79,255 AUMs on public land available to deer and antelope and eliminate livestock/wildlife competition. Livestock/wildlife competition on private and State land would continue at the present rate or increase.

Antelope numbers on non-public land would be expected to remain stable, while the improved antelope habitat on public land would increase antelope numbers. While deer habitat would be improved, other factors limiting deer numbers would have to be changed before deer could be expected to increase. The antelope on public land

in the Ladron Antelope Herd Unit would increase about seven new animals. All other herd units would increase about 62 new animals on public land. In the long term the total number of antelope is expected to be 720.

**SMALL MAMMALS**

The movement of equipment and materials during construction of range developments would kill some small mammals. The removal of vegetation by construction would increase predation on the remaining animals in the area. Small mammals leaving the disturbed area would also be subject to increased predation because of unfamiliarity with the new area and increased stress. This would be a short-term, local impact.

The one-acre livestock exclosures around the additional wildlife waters and springs, while protecting the developments from livestock trampling, would provide cover and forage for small mammals. These habitat areas would be further enhanced at selected wildlife waters by allowing the water to trickle out over a 4- to 6-square foot area. These irrigated areas would provide succulent grass and forb growth for small mammals. This would be a long-term, area-wide impact. Generally, water availability is not considered a limiting factor for small mammals.

The improvement in range condition and decrease in utilization would cause a long-term, area-wide decrease in the total number of small mammals in most areas other than riparian areas, even though the number of cottontail rabbits would increase. Smith (1940) found that jackrabbits prefer overgrazed range, while cottontails like moderately grazed range. Monson and Kessler (1940) noted that rodents increase as overgrazing progresses. Wood (1969) says that the closer the vegetation approaches climax, the fewer species and number of rodents the area would support.

It is not possible to quantify the change in small mammal numbers due to their normally high variability. This would be a long-term, area-wide impact.

**Proposed Action** - The construction of range developments would displace or kill some small mammals on the affected 580 acres. The 52 acres of livestock exclosures around 48 wildlife waters and 4 springs would improve cover and forage for small mammals.

As range condition improves (Table 2-6) and utilization decreases from heavy to moderate, total small mammal numbers would decrease, while cottontail rabbit numbers would increase. It is not possible to quantify this change.

**No Action Alternative** - Small mammals would be displaced or killed by construction of range developments on 90 acres on 8 of the 25 existing AMPs. The 10 acres of livestock exclosures around 9 wildlife waters and 1 spring would improve cover and forage for small mammals. The improvement of vegetative conditions and the reduction of utilization from heavy to moderate on the 25 existing AMPs would reduce the total small mammal numbers, while increasing cottontail rabbit numbers. This change cannot be quantified. The continuation of the present levels of management on 96 non-AMP allotments would not change the existing small mammal habitat.

**Livestock Adjustment Alternative** - Construction of range developments would displace or kill small mammals on 90 acres on 8 of the 25 existing AMPs. The 10 acres of livestock exclosures around 9 wildlife waters and 1 spring would improve cover and forage for small mammals. There would be no construction of range developments on the 96 non-AMP allotments.

As range condition improves (Table 2-6) and utilization decreases from heavy to moderate, total small mammal numbers would decrease, while cottontail rabbit numbers would increase. This change cannot be quantified.

**Pasture Capacity Level Alternative** - The construction of range developments would displace or kill some small mammals on the affected 580 acres. The 52 acres of livestock exclosures around 48 wildlife waters and 4 springs would improve cover and forage for small mammals.

As range condition improves (Table 2-6) and utilization decreases from heavy to moderate, total small mammal numbers would decrease, while cottontail rabbit numbers would increase. It is not possible to quantify this change.

**Enhancement of Sensitive Resource Values Alternative** - During the construction of range developments, some of the small mammals on the affected 607 acres would be displaced or killed. The 52 acres of livestock exclosures around 48 wildlife waters and 4 springs would improve cover and forage for small mammals. The fencing of 12 selected riparian areas totaling 2,320 acres would further improve small mammal habitat. As range condition improves (Table 2-6) and utilization decreases from heavy to moderate, total small mammal numbers would decrease, while cottontail rabbit numbers would increase. This change cannot be quantified.

**No Grazing Alternative** - Range developments would not be constructed on public land. An estimated 1,475 miles of fences would be constructed on non-public land, affecting those small mammals on the estimated 1,475 acres involved. As range condition improves (Table 2-6) and utilization decreases from heavy to no grazing, total small mammal numbers would decrease, while

cottontail rabbit numbers would increase. It is not possible to quantify this change.

**BIRDS**

Human activity and noise during construction of range developments would have the short-term, local effect of displacing birds from the immediate area. The birds would probably return to this area after construction has ended. The new fences would provide increased perches for birds. The loggerhead shrike uses the barbs on barb wire to impale and store its prey (Ligon, 1961). The one-acre exclosures around new wildlife waters and springs would provide increased food and cover. New water developments, in addition to the existing 785, would provide watering sites for birds. Campbell (1960) found that availability of water for quail did not significantly increase the quail population. The new waters would affect the fall and winter quail distribution by attracting them to new areas.

The reduced trampling of nests and young birds by livestock would result from improved cover, reduced livestock numbers, deferred pastures, and elimination of grazing. The concentration of livestock in use pastures would have a short-term, local impact of increasing trampling. The reduced trampling of nests and young birds would increase nesting success and survival of ground nesting birds, in particular quail. This would be a long-term, area-wide impact.

Where livestock caused noticeable changes in vegetation, major shifts in the bird community composition were noted (Wiens and Dyer, 1975). The increased vegetative production, density, and cover would increase cover and food available to birds. The increased cover would reduce the loss of birds and their ground nests to trampling and predation. Schemnitz (1961) found that a scaled quail population on overgrazed land was affected by lack of cover. As the vegetative density and cover improved, it provided more cover for quail and their nests. The improved cover would reduce quail mortality to predators and weather. Bird numbers and species diversity would increase with the improved vegetative density and cover. This would be a long-term, area-wide impact which cannot be quantified.

Howard and Wolfe (1976) found that reduced numbers of jackrabbits resulted in reduced reproduction of ferruginous hawks. Raptor distribution would be reduced as a result of reduced jackrabbit numbers. This long-term, area-wide impact cannot be quantified.

**Proposed Action** - During construction of range developments birds would be displaced from 580 acres. The presence of 214 miles of fences would improve bird habitat by providing perches for birds. The water developments would benefit birds through improved vegetation found in the 52 acres of exclosures around 48 wildlife waters and 4 springs. Bird habitat would be improved by the better water distribution from the additional 79 troughs and 48 wildlife waters.

Trampling of nests and young birds would be reduced when cover increases 3 percent, vegetative production increases 37 percent (in AUMs), utilization decreases from heavy to moderate, and grazing is eliminated on 1,987 acres. The improved vegetative production and composition would provide increased cover and food for birds. This would increase bird numbers and species diversity. This change cannot be quantified. Raptor distribution would be influenced an unquantifiable amount by the reduction in jackrabbit numbers.

**No Action Alternative** - Birds would be displaced by the construction of range developments on 90 acres on 8 of the 25 existing AMPs. Bird perches would be increased by the addition of 14 miles of fences. The 10 acres of livestock exclosures around 9 wildlife waters and 1 spring would improve cover and food for birds. The addition of 18 troughs and 9 wildlife waters would increase water distribution for birds. The livestock adjustments and grazing systems would improve cover and reduce trampling. This would increase bird numbers and species diversity on the 25 existing AMPs. The continuation of the present levels of management on 96 non-AMP allotments would not change the existing bird habitat.

**Livestock Adjustment Alternative** - The construction of range developments on 8 of the 25 existing AMPs would displace birds from 90 acres. The 10 acres of livestock exclosures around 9 wildlife waters and 1 spring would improve cover and food for birds. The increased water distribution from the additional 18 troughs and 9 wildlife waters would improve bird habitat.

Trampling of nests and young birds would be reduced when cover increases 2 percent, vegetative production increases 30 percent (in AUMs), utilization decreases from heavy to moderate, and grazing is eliminated on 1,987 acres. The improved vegetative production and composition would also provide increased cover and food for birds. This would increase bird numbers and species diversity. This change cannot be quantified. Raptor distribution would be influenced an unquantifiable amount by reduced jackrabbit numbers. There would be no construction of range developments on the 96 non-AMP allotments.

**Pasture Capacity Level Alternative** - During construction of range developments birds would be displaced from 580 acres. The presence of 214 miles of new fences would provide additional

perches for birds. Bird habitat would be improved by improved vegetation on 52 acres of exclosures around 48 wildlife waters and 4 springs. Improved water distribution from 79 additional troughs and 48 wildlife waters would improve bird habitat.

Trampling of nests and young birds would be reduced when cover increases 8 percent, vegetative production increases 61 percent (in AUMs), utilization decreases from heavy to light, and grazing is eliminated on 1,987 acres. The improved vegetative production and composition would also provide increased cover and food for birds. The improved composition would increase bird numbers and species diversity. This change cannot be quantified. Raptor distribution would be influenced an unquantifiable amount by the reduction in jackrabbit numbers.

**Enhancement of Sensitive Resource Values Alternative** - During construction of range developments birds would be displaced on 607 acres. The presence of 241 miles of new fences would provide additional bird perches. The 52 acres of livestock exclosures around 48 wildlife waters and 4 springs would increase cover and food for birds. The increased water distribution from the 79 additional troughs and 48 wildlife waters would improve bird habitat.

Trampling of nests and young birds would be reduced when cover increases 8 percent, vegetative production increases 64 percent (in AUMs), utilization decreases from heavy to light, and grazing is eliminated on 218,191 acres in the short term and 22,286 acres in the long term. The improved vegetative production and composition and exclosures around 2,320 acres from 12 selected riparian areas would also provide increased cover and food for birds. This would increase bird numbers and species diversity. This change cannot be quantified. Raptor distribution would be influenced an unquantifiable amount by reduced jackrabbit numbers.

**No Grazing Alternative** - The elimination of grazing on 838,808 acres of public land would eliminate the impact of livestock trampling. No range developments would be constructed on public land; however, the addition of 1,475 miles of fences on non-public land would provide increased perches for birds. The 8-percent improvement in cover, decreased utilization from heavy to ungrazed, and the elimination of grazing on 838,808 acres would reduce trampling of nests and young birds. The improved vegetative production and composition would increase for birds. This change cannot be quantified. Raptor distribution would be influenced an unquantifiable amount by reduced jackrabbit numbers.

## THREATENED OR ENDANGERED SPECIES

The U. S. FWS was contacted regarding possible impacts on federally endangered species habitat as required under Section 7 of the Endangered Species Act of 1973. Endangered species historically occurring in the ES Area include the bald eagle, black-footed ferret, and peregrine falcon. The Socorro isopod and whooping crane are found on lands adjacent to the ES Area. On July 28, 1978 FWS responded to BLM's consultation request and their general findings are as follows: It is the biological opinion of the FWS that neither the continued existence of endangered species nor the habitat essential to their survival would be affected.

Three State listed species occur on public land (Table 2-29) in the area. Two of these, the little blue heron, and the Olivaceous cormorant, nest over water and would not be impacted. Baird's sparrow may migrate through the area but would not be impacted.

Four other species on the State list (Mississippi kite, Bell's Vireo, Osprey and Redheaded woodpecker) are found on the Bosque del Apache Refuge adjacent to the ES Area. These species have not been observed on public lands. The habitat type, tall trees and open water, for these species is not impacted.

**Proposed Action** - No impacts to T or E species should occur.

**No Action Alternative** - No impacts to T or E species should occur.

**Livestock Adjustment Alternative** - No impacts to T or E species should occur.

**Pasture Capacity Level Alternative** - No impacts to T or E species should occur.

**Enhancement of Sensitive Resource Values Alternative** - No impacts to T or E species should occur.

**No Grazing Alternative** - No impacts to T or E species should occur.

## UNIQUE RIPARIAN AREAS

Livestock adjustments and grazing systems would improve production, density, cover, composition, and condition in the seven unique riparian areas. This would improve habitat for birds and small mammals. This impact cannot be quantified.

**Proposed Action** - Livestock grazing would decrease from heavy to moderate on five areas and would remain at the present light to moderate level on Ponia Creek and the Mesa Carrizo stream. This would cause an unquantifiable improvement in riparian habitat.

**No Action Alternative** - Utilization would decrease from heavy to moderate on Ponia Creek, Arroyo Colorado Springs, and Las Canas Spring; these areas are within the 25 existing AMP allot-

ments that would continue to be intensively managed. The improvement in riparian habitat would be unquantifiable. Because there would be no change on the non-AMP allotments, riparian habitat of the other unique areas would not change.

**Livestock Adjustment Alternative** - Utilization would decrease from heavy to moderate on Ponia Creek, Arroyo Colorado Springs, and Las Canas Spring, these areas are within the 25 existing AMP allotments that would continue to be intensively managed. The improvement in riparian habitat would be unquantifiable. Because there would be no change on the non-AMP allotments, riparian habitat of the other unique areas would not change.

**Pasture Capacity Level Alternative** - Utilization would decrease from heavy to moderate on five areas and would remain at the present moderate level on Ponia Creek and Mesa Carrizo stream. This would cause an unquantifiable improvement in riparian habitat.

**Enhancement of Sensitive Resource Values Alternative** - On Ponia Creek utilization would continue to be moderate. On Ojo Saladito utilization would decrease from heavy to moderate. About one-half (2 miles) of the Mesa Carrizo stream and all of the Rio Salado except that portion on allotment 121 would be ungrazed. Utilization would decrease from heavy to moderate on the remaining part of Mesa Carrizo stream and that part of the Rio Salado occurring on allotment 121. Las Canas Spring and Elephant Butte Marsh would not be grazed under this alternative. This would cause an unquantifiable improvement in riparian habitat.

**No Grazing Alternative** - Four areas, Ponia Creek, Arroyo Colorado Springs, Las Canas Spring, and Ojo Saladito, are totally on private land and would continue to be grazed as they presently are. There would be no improvement in riparian habitat on these areas. Two areas, Mesa Carrizo Streams and Rio Salado, are located on both private and public lands. The portions of these areas on public land would be ungrazed. Use on the remainder would not change as grazing would continue at the present level. Elephant Butte Marsh would not be grazed under this alternative. There would be an unquantifiable improvement in riparian habitat in these ungrazed areas.

## AQUATIC HABITAT

Excessive livestock utilization would impact aquatic habitat through the removal of stream bank cover, trampling of stream banks, and lowering of water quality. The removal of stream bank cover would remove shade producing shrubs and open the banks up to erosion. The trampling of stream banks would beat down the banks and open them up to increased erosion. The reduced shade and increased water turbidity would reduce water quality.

The present slight to moderate livestock utilization in Ponia Creek is not expected to change. Its small disturbance to vegetation due to limited livestock access would have no impacts on the aquatic habitat. The present high water level of 800 surface acres of the Elephant Butte Marsh limits livestock utilization to the edge of the Marsh. The slight to heavy livestock utilization on the Marsh's edge would not impact aquatic habitat.

**Proposed Action** - The aquatic habitat and species in Ponia Creek and Elephant Butte Marsh would not be changed from their present condition.

**No Action Alternative** - The aquatic habitat and species in Ponia Creek and Elephant Butte Marsh would not be changed from their present condition.

**Livestock Adjustment Alternative** - The aquatic habitat and species in Ponia Creek and Elephant Butte Marsh would not be changed from their present condition.

**Pasture Capacity Level Alternative** - The aquatic habitat and species in Ponia Creek and Elephant Butte Marsh would not be changed from their present condition.

**Enhancement of Sensitive Resource Values Alternative** - The aquatic habitat and species in Ponia Creek and Elephant Butte Marsh would not be changed from their present condition.

**No Grazing Alternative** - The aquatic habitat and species in Ponia Creek and Elephant Butte Marsh would not be changed from their present condition.

## CUMULATIVE IMPACTS

**Proposed Action** - Deer numbers would remain stable, while antelope numbers would increase from 648 to 763 in the long term. Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. Bird numbers and species diversity would increase. T or E species would not be impacted.

**No Action Alternative** - On the 25 existing AMPs deer numbers would be stable, while antelope numbers would increase 17 animals for a total of 665. Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. The continuation of the present management on 96 non-AMP allotments would not change the existing wildlife habitat. T or E species would not be impacted.

**Livestock Adjustment Alternative** - Deer numbers would remain stable, while antelope numbers would increase from 648 to 712 in the long term.

Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. Bird numbers and species diversity would increase. T or E species would not be impacted.

**Pasture Capacity Level Alternative** - Deer numbers would remain stable, while antelope numbers would increase from 648 to 773 in the long term. Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. T or E species would not be impacted.

**Enhancement of Sensitive Resource Values Alternative** - Deer numbers would remain stable, while antelope numbers would increase from 648 to 779 in the long term. Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. T or E species would not be impacted.

**No Grazing Alternative** - Deer numbers would remain stable, while antelope numbers on public land would increase 72 animals for a total of 720 in the long term. Total small mammal numbers would decrease, while cottontail rabbit numbers would increase. Bird numbers and species diversity would increase. T or E species would not be impacted.

### *Unavoidable Adverse Impacts*

The Proposed Action would have unavoidable adverse impacts on wildlife. The increases in human activity and added hazards due to construction, fences and cattleguards, and grazing systems would impact all wildlife. The unauthorized use of temporary roads would place stress on wildlife near the roads. The roads would open the area to poachers. The construction of range developments would remove 580 acres of forage from use. This unavoidable impact would be short term. Some forage should return in 4 to 5 years with 339 acres impacted in the long term.

The concentration of livestock in use pastures would tend to displace deer in that pasture or location.

The concentration of livestock in grazed pastures would increase competition between livestock and wildlife within the pasture. As forage improves, the impact would be reduced but would never be completely eliminated.

## WILD HORSES

### *Existing Environment*

#### DESCRIPTION OF AREA

The Bordo Atravesado Wild Horse Management Area, located on the Bordo Atravesado (254) Allotment, is approximately 18 miles northeast of Socorro, New Mexico (Visual A). There are 19,606 acres in the wild horse management area consisting of 16,493 acres of public land (84 percent), 548 acres of private land (3 percent), and 2,565 acres of State land (13 percent).

The topography is generally mountainous with rolling limestone hills. The elevation varies between 5,525 and 6,600 feet. The vegetative aspect is juniper. The percent average composition of major vegetative species within the wild horse management area is summarized in Table 2-30.

#### DESCRIPTION AND SOCIAL ORGANIZATION

The wild horses of the Bordo Atravesado Herd are smaller in size than domestic horses. The herd is comprised of three bands. Two of the bands consist of mares controlled by a stallion; the third band is a small group of stallions. In late fall the bands of horses join together into a single herd and are controlled by one stallion with a lead mare.

#### BEHAVIOR

The free roaming behavior of the wild horses was somewhat disrupted when an AMP was implemented in 1968. This implementation resulted in dividing the home range of the horses into three pastures. These are the Bustos, New Well, and New Tank pastures (Map 2-9). Reports or signs of wild horse activity have been rare on adjacent allotments. Inventories since 1974 show that the horses are not completely restricted by pasture fences. The horses have found small crossings into the pastures across mountainous terrain; however, these passages are not usually accessible by livestock. During deer hunting season (November) the horses leave the New Tank Pasture and migrate into Bustos or New Well Pasture. The horses move into Bustos Pasture through a natural barrier (rim rock) and into New Well Pasture through natural crossings and open gates at New Tank Reservoir.

#### FOOD HABITS

Based on a four-season fecal study of the Bordo Atravesado wild horse herd, Summer 1976 - Spring 1977, the horses' diet is made up of 84 percent grasses, 8 percent shrubs, and 8 percent forbs. Grasses made up as much as 98 percent of their diet in the summer and as little as 64 percent in the winter. Shrubs made up as much as 16 percent of their diet in the fall and as little as 1 percent in the summer. Forbs made up 25 percent of their diet in the winter and 0 percent in the summer (Table 2-30).

#### COMPETITION

Dietary overlap between cattle, deer, and wild horses was calculated from fecal study analysis

TABLE 2-30

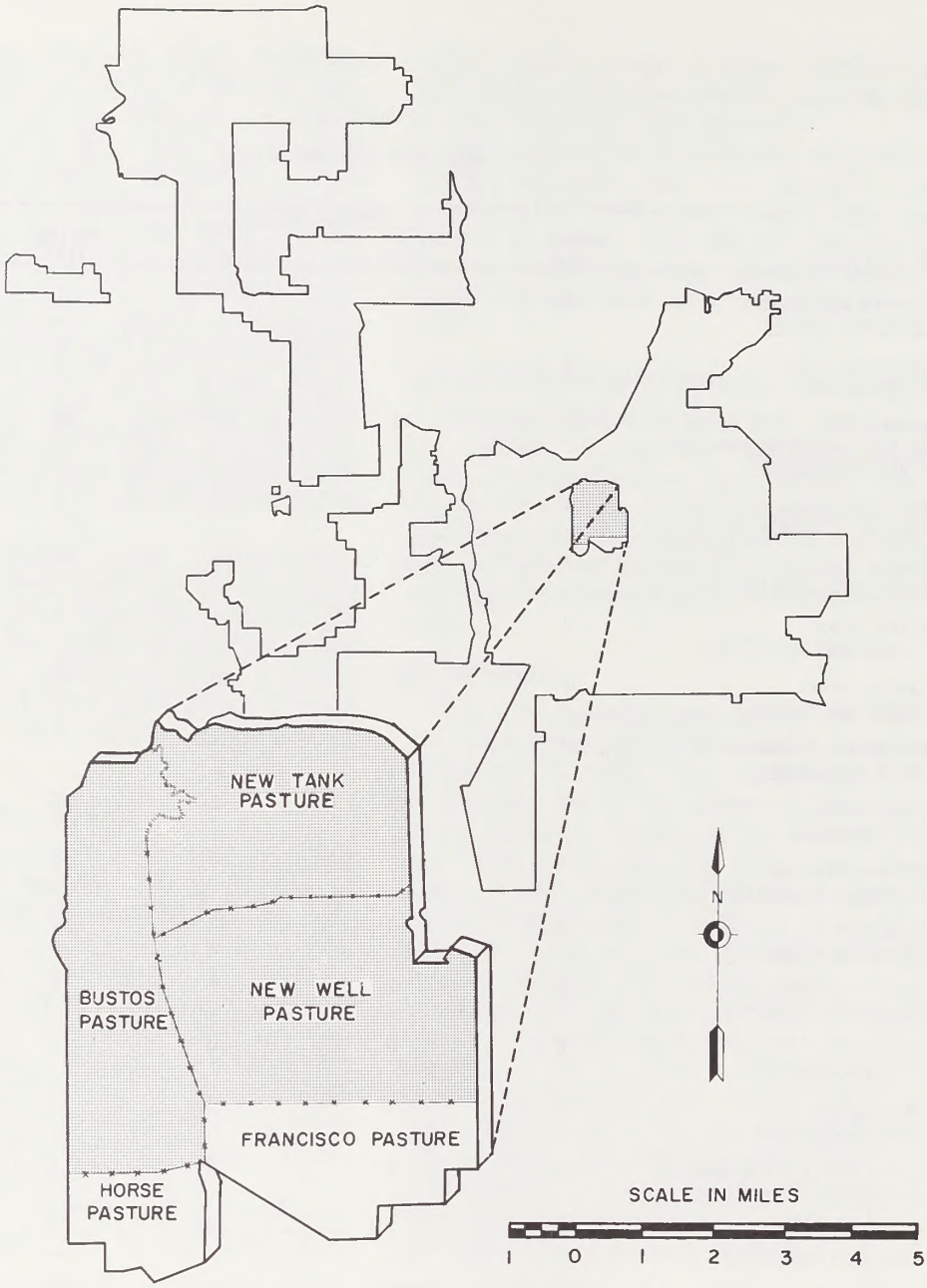
WILD HORSE FOOD HABITS a/

| Major Plants | Summer 1976 | Percent in Diet Fall 1976 | Winter 1977 | Spring 1977 | Percent Average Composition b/ |
|---|---|---|---|---|---|
| Western wheatgrass *Agropyron smithii* | 3 | 3 | 0 | 0 | Tr. |
| Three-awn grass *Aristida spp.* | 4 | 3 | 2 | 3 | Tr. |
| Grama grass *Bouteloua eriopoda* and *Bouteloua gracilis* | 43 | 38 | 25 | 46 | 26 |
| Wolf-tail grass *Lycurus phleoides* | 6 | 3 | 1 | 4 | Tr. |
| Purple muhly *Muhlenbergia rigida* | 6 | 13 | 10 | 15 | 18 |
| Burro grass *Scleropogon breviflorus* | 1 | 2 | 0 | 0 | Tr. |
| Sacaton grass *Sporobolus wrightii* | 32 | 14 | 20 | 17 | 3 |
| New Mexico feathergrass *Stipa neomexicana* | 2 | 3 | 5 | 8 | Tr. |
| Slim tridens *Tridens mutica* | 1 | 2 | 1 | 0 | Tr. |
| Slendergray sage *Artemisia bigelovii* | 1 | 16 | 9 | 5 | Tr. |
| Buckwheat *Eriogonum wrightii* | 1 | 0 | 21 | 0 | Tr. |
| Gordon's bladderpod *Lesquerella gordonii* | 0 | 1 | 4 | 2 | Tr. |
| Galleta *Hilaria jamesii* | 0 | 0 | 0 | 0 | 3 |
| Hairy grama *Bouteloua hirsuta* | 0 | 0 | 0 | 0 | 2 |
| Hairy mountain mahogany *Cercocarpus breviflorus* | 0 | 0 | 0 | 0 | 2 |
| One-seed juniper *Juniperus monosperma* | 0 | 0 | 0 | 0 | 9 |
| TOTAL | 100 | 98 | 98 | 100 | |

Sources:

a/ Food habits for wild horses were determined from the fecal study analysis performed by the Composition Analysis Laboratory at Colorado State University.

b/ Based on 1975-77 BLM Range Survey. Percent average composition of available vegetation.




BORDO ATRAVESADO ALLOTMENT (254)

Wild Horse Management Area

(SOURCE: BLM Socorro District Files)

**MAP 2-9.** Wild Horse Management Area in the Bordo Atravesado Allotment (254)

performed by Colorado State University. The dietary overlap between wild horses and deer during summer, fall, winter, and spring is 1, 1, 4, and 1 percent, respectively. The dietary overlap between wild horses and livestock during summer, fall, winter, and spring is 76, 62, 47, and 68 percent, respectively.

Competition between wild horses and deer for food, water, space, and cover appears to be slight in the wild horse area. Cattle and horses compete from a moderate to heavy degree for the same plants. No apportionment of forage for wild horses was made when the AMP was originally implemented. The competition between cattle and wild horses for space, water, and cover does not seem to be a problem in the wild horse area. Deer have been seen browsing less than 50 feet from a wild horse band, and cattle have been seen grazing within the primary horse use areas (aerial reconnaissance). A high density of deer and cattle fecal material has been observed within primary wild horse use areas.

**POPULATION STATUS**

Aerial reconnaissance inventories made from November 1975 through October 1977 show that wild horse numbers have fluctuated from 32 to 43. The population trend is undetermined. A wild horse management plan is to be written. This plan will use information on population characteristics such as: sex ratio, age structure, and population trend to set the number of horses to be managed for.

***Future Environment***

Allotment 254 is covered by an existing AMP; therefore, it would continue to be intensively managed. As cattle numbers are adjusted to balance grazing use with forage production and forage is apportioned to wild horses and deer, demand upon the vegetative resource would not exceed forage production. In the long term forage is expected to increase from 384 to 549 AUMs. This would be sufficient forage to support 46 wild horses (Table 2-31).

***Impacts***

**FOOD HABITS**

Grasses, a wild horse preferred forage, were the species that were predicted to increase with intensive management. The production of shrubs was also predicted to have a small increase.

**Proposed Action** - As cattle numbers are decreased from 202 to 100 AUs in the wild horse area and the wild horse herd is apportioned 384 AUMS of forage, demand upon the present vegetative resource would be brought into line with present forage production. This would insure that an adequate supply of forage is available for the horse herd in the short term. In the long term total forage production on the allotment is expected to increase to 3,217 AUMs with grasses making up the majority of the increase. Five hundred and forty-nine (549) AUMs of this forage would be apportioned to wild horses. This would provide an abundant supply of wild horse preferred forage species (Table 2-31).

**No Action Alternative** - Because allotment 254 is an existing AMP allotment, intensive management would continue; therefore, as cattle numbers are decreased from 202 to 100 AUs and the wild horse herd is apportioned 384 AUMs of forage, demand upon the present vegetative resource would be brought into line with present forage production. This would insure that an adequate supply of forage is available for the horse herd in the short term. In the long term forage production on the allotment is expected to increase to 3,217 AUMs with grasses making up the majority of the increase. Five hundred and forty-nine (549) AUMs of this forage would be apportioned to wild horses. This would provide an abundant supply of wild horse preferred forage species (Table 2-31).

**Livestock Adjustment Alternative** - Because allotment 254 is an existing AMP allotment, intensive management would continue; therefore, as cattle numbers are decreased from 202 to 100 AUs and the wild horse herd is apportioned 384 AUMs of forage, demand upon the present vegetative resource would be brought into line with present forage production. This would insure that an adequate supply of forage is available for the horse herd in the short term. In the long term forage production on the allotment is expected to increase to 3,212 AUMs with grasses making up the majority of the increase. Five hundred and forty-nine (549) AUMs of this forage would be apportioned to wild horses. This would provide an abundant supply of wild horse preferred forage species (Table 2-31).

**Pasture Capacity Level Alternative** - As cattle numbers are decreased from 202 to 100 AUs and the wild horse herd is allocated 384 AUMs of forage, demand upon the present vegetative resource would be brought into line with present forage production. This would insure that an adequate supply of forage is available for the horse herd in the short term. In the long term forage production on the allotment is expected to increase to 3,217 AUMs with grasses making up the majority of the increase. Five hundred and forty-nine (549) AUMs of this forage would be apportioned to wild horses. This would provide an abundant supply of wild horse preferred forage species (Table 2-31).

TABLE 2-31

FORAGE DISTRIBUTION OF SHORT- AND LONG-TERM PREDICTIONS FOR THE WILD HORSE MANAGEMENT AREA

| | EE | NA/FE Short Term | NA/FE Long Term | PA/LA Short Term | PA/LA Long Term | PCL Short Term | PCL Long Term | ESR Short Term | ESR Long Term | NG Short Term | NG Long Term |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Wild Horse Numbers 1/ | 32 | 32 | 46 | 32 | 46 | 32 | 46 | 132 | 259 | 141 | 295 |
| Acres (Wild Horse Home Range) | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 | 19,606 |
| Wild Horses AUMs | 0 | 384 | 549 | 384 | 549 | 384 | 549 | 1,583 | 3,111 | 1,695 | 3,535 |

/1 Horse numbers are based solely on forage distribution and predicted increases. Population characteristics of the wild horse herd are unknown and could not be used to predict changes in horse numbers.

EE - EXISTING ENVIRONMENT
NA/FE - NO ACTION ALTERNATIVE AND FUTURE ENVIRONMENT
PA - PROPOSED ACTION
LA - LIVESTOCK ADJUSTMENT ALTERNATIVE
PCL - PASTURE CAPACITY LEVEL ALTERNATIVE
ESR - ENHANCEMENT OF SENSITIVE RESOURCE VALUES ALTERNATIVE
NG - NO GRAZING ALTERNATIVE

Source: Table A-1 (Appendix 1, p. A-1) and Table A-18 (Appendix 2, p. A-58)

**Enhancement of Sensitive Resource Values Alternative** - All cattle grazing would be eliminated from the three pastures comprising the wild horse management area. In the short term the forage that would be available to the horses would be 1,583 AUMs in these three pastures. In the long term total forage production on the allotment is expected to increase to 4,305 AUMs with grasses making up the majority of the increase. Three thousand one hundred and eleven (3,111) AUMs of this forage would be apportioned to wild horses (Table 2-31). The remainder of the AUMs would be apportioned to wildlife in the wild horse management area and to wildlife and cattle on the remainder of the allotment.

**No Grazing Alternative** - All cattle grazing would be eliminated from the public land within the wild horse management area. In the short term the forage that would be available to the horses would be 1,695 AUMs. In the long term forage production on the allotment is expected to increase to 4,200 AUMs with grasses making up the majority of the increase. Three thousand five hundred and thirty-five (3,535) AUMs of this forage would be apportioned to wild horses (Table 2-31). The remainder of the AUMs would be apportioned to wildlife (from public land) and to cattle on the private and State land.

**COMPETITION**

The fecal analysis study conducted over a four season period indicated that horses and deer are not competing for the same forage plants in the wild horse area. Based on the study the dietary overlap between wild horses and deer is 4 percent during the winter and 1 percent during the remainder of the year. The study indicated, however, that cattle and horses are directly competing for the same forage plants. The dietary overlap between wild horses and cattle during the summer, fall, winter, and spring was 76, 62, 47, and 68 percent, respectively.

**Proposed Action** - As cattle numbers are reduced from 202 to 100 AUs and 384 AUMs of forage are apportioned to wild horses, demand on the vegetative resource would be brought into line with present forage production in the short term. Although cattle and horses would still be competing for the same kind of plants, grazing use would not exceed production; therefore, competition for food would be reduced. In the long term use would be kept in line with production; therefore, competition for food would also be reduced. Deer would be apportioned 67 AUMs of forage in the short term and 71 AUMs of forage in the long term, based on existing and predicted numbers. This would prevent any wild horse and deer competition for food.

**No Action Alternative** - As cattle numbers are reduced from 202 to 100 AUs and 384 AUMs of forage are apportioned to wild horses, demand on the vegetative resource would be brought into line with present forage production in the short term. Although cattle and horses would still be competing for the same kind of plants, grazing use would not exceed production; therefore, competition for food would be reduced. In the long term use would be kept in line with production; therefore, competition for food would also be reduced. Deer would be apportioned 67 AUMs of forage in the short term and 71 AUMs in the long term, based on existing and predicted numbers. This would prevent any wild horse and deer competition for food.

**Livestock Adjustment Alternative** - As cattle numbers are reduced from 202 to 100 AUs and 384 AUMs of forage are apportioned to wild horses, demand on the vegetative resource would be brought into line with present forage production in the short term. Although cattle and horses would still be competing for the same kind of plants, grazing use would not exceed production; therefore, competition for food would be reduced. In the long term use would be kept in line with production; therefore, competition for food would also be reduced. Deer would be apportioned 67 AUMs of forage in the short term and 71 AUMs in the long term, based on existing and predicted numbers. This would prevent any wild horse and deer competition for food.

**Pasture Capacity Level Alternative** - As cattle numbers are reduced from 202 to 100 AUs and 384 AUMs of forage are apportioned to wild horses, demand on the vegetative resource would be brought into line with present forage production in the short term. Although cattle and horses would still be competing for the same kind of plants, grazing use would not exceed production; therefore, competition for food would be reduced. In the long term use would be kept in line with production; therefore, competition for food would also be reduced. Deer would be apportioned 67 AUMs of forage in the short term and 71 AUMs in the long term, based on existing and predicted numbers. This would prevent any wild horse and deer competition for food.

**Enhancement of Sensitive Resource Values Alternative** - Cattle grazing would be eliminated in the wild horse home range. There would be no competition between horses and cattle. Deer would be apportioned 67 AUMs in the short term and 71 AUMs in the long term, based on existing and predicted numbers. This would prevent any wild horse and deer competition for food.

**No Grazing Alternative** - Cattle grazing would be eliminated on all public land within the allot-

ment. There would be no competition between horses and cattle. Deer would be apportioned 67 AUMs in the short term and 71 AUMs in the long term, based on existing and predicted numbers. This would prevent any wild horse and deer competition for food.

## POPULATION

Very little is known about the population characteristics of the wild horse herd. Also, the wild horse management plan has not been written. The numbers to be managed would be decided upon through this plan; therefore, the predicted increase of horse numbers is based solely on the predicted forage increases of preferred wild horse forage species for the Proposed Action and each alternative.

**Proposed Action** - In the short term 384 AUMs would be apportioned to the wild horses. This is sufficient forage to support 32 wild horses. In the long term forage for wild horses is expected to increase to 549 AUMs within the management area. This would be sufficient forage to support 46 wild horses (Table 2-31).

**No Action Alternative** - In the short term 384 AUMs would be apportioned to the wild horses. This is sufficient forage to support 32 wild horses. In the long term forage for wild horses is expected to increase to 549 AUMs within the management area. This would be sufficient forage to support 46 wild horses (Table 2-31).

**Livestock Adjustment Alternative** - In the short term 384 AUMs would be apportioned to the wild horses. This is sufficient forage to support 32 wild horses. In the long term forage for wild horses is expected to increase to 549 AUMs within the management area. This would be sufficient forage to support 46 wild horses (Table 2-31).

**Pasture Capacity Level Alternative** - In the short term 384 AUMs would be apportioned to the wild horses. This is sufficient forage to support 32 wild horses. In the long term forage for wild horses is expected to increase to 549 AUMs within the management area. This would be sufficient forage to support 46 wild horses (Table 2-31).

**Enhancement of Sensitive Resource Values Alternative** - Cattle grazing would be eliminated in the wild horse area. In the short term 1,583 AUMs would be apportioned to the wild horses. This is sufficient forage to support 132 wild horses. In the long term forage for wild horses is expected to increase to 3,111 AUMs within the management area. This would be sufficient forage to support 259 wild horses (Table 2-31).

**No Grazing Alternative** - Under this alternative all cattle grazing would be eliminated on public lands within the allotment. Based on available forage the home range could support 141 wild horses in the short term. In the long term forage is expected to increase to 3,535 AUMs. This would be sufficient forage to support 295 wild horses (Table 2-31).

## CUMULATIVE IMPACTS

**Proposed Action** - Grasses, the preferred wild horse forage species, are predicted to increase in the long term and provide an abundant supply of forage. Competition for food would be reduced in the short and long terms by apportioning 384 and 549 AUMs, respectively, to the wild horses. There would be sufficient forage to support 32 and 46 horses in the short and long terms, respectively.

**No Action Alternative** - Grasses, the preferred wild horse forage species, are predicted to increase in the long term and provide an abundant supply of forage. Competition for food would be reduced in the short and long terms by apportioning 384 and 549 AUMs, respectively, to the wild horses. There would be sufficient forage to support 32 and 46 horses in the short and long terms, respectively.

**Livestock Adjustment Alternative** - Grasses, the preferred wild horse forage species, are predicted to increase in the long term and provide an abundant supply of forage. Competition for food would be reduced in the short and long terms by apportioning 384 and 549 AUMs, respectively, to the wild horses. There would be sufficient forage to support 32 and 46 horses in the short and long terms, respectively.

**Pasture Capacity Level Alternative** - Grasses, the preferred wild horse forage species, are predicted to increase in the long term and provide an abundant supply of forage. Competition for food would be reduced in the short and long terms by apportioning 384 and 549 AUMs, respectively, to the wild horses. There would be sufficient forage to support 32 and 46 horses in the short and long terms, respectively.

**Enhancement of Sensitive Resource Values Alternative** - Grasses, the preferred wild horse forage species, are predicted to increase in the long term. Competition for food would be eliminated in the short and long terms. In the short and long terms 1,583 and 3,111 AUMs, respectively, would be apportioned to the wild horses. There would be sufficient forage to support 132 and 259 horses in the short and long terms, respectively.

**No Grazing Alternative** - Grasses, the preferred wild horse forage species, are predicted to increase in the long term. Competition for food would be eliminated in the short and long terms. In the short and long terms 1,695 and 3,535 AUMs, respectively, would be apportioned to the

wild horses. There would be sufficient forage to support 141 and 295 horses in the short and long terms, respectively.

## CULTURAL RESOURCES

### *Existing Environment*

Cultural resources in the ES Area were identified through three surveys. The first survey was a literature search conducted by the School of American Research in 1975. The second and third surveys were part of a stratified random sample design and were conducted by New Mexico State University in 1976 and 1977; they did not, however, cover the entire ES Area. These reports are filed at the BLM Socorro District Office. As a result of these surveys 332 archaeological sites have been recorded. Of this total, 204 sites are on public lands. Consultation with the State Historic Preservation Officer was initiated on November 4, 1976 to determine the presence of other cultural resources, particularly those on, or eligible for inclusion in, the National Register of Historic Places.

Sites in this region suggest human habitation for 15,000 years. Identified cultural affinities of the sites are Paleo-Indian, Archaic, Anasazi, Jornada Mogollon, Historic Piro, Spanish-American, and Anglo-American. Site functions are usually campsites, permanent habitations, or procurement/processing loci; other functions include prehistoric defense, socio-religious activities, mining, and historic warfare.

Few reports have been published on the early cultures of this region. As a result, the ideas concerning cultural use are inferred from studies in surrounding areas. Further information on various cultures can be found in the following references:

Paleo-Indian - Wormington, 1957 and Judge, 1973

Archaic - Campbell and Ellis, 1952; Dick, 1965; and Irwin-Williams, 1973

Anasazi/Jornada Mogollon - Kidder, 1923; Marshall, 1973; Mera, 1940; and Wormington, 1947

Piro - Scholes, 1940 and Vivian, 1964

Spanish-American - Bolton, 1949 and Day, 1940

Existing data indicates four areas of high site density. These are Arroyo Colorado, Rio Salado, Rio Grande Valley, and Chupadera Wash-Jornada del Muerto (Map 2-10). Arroyo Colorado may have a high site density; only nine sites were located in the literature search, and no systematic surveys have been conducted. However, the cluster of sites is much greater than in surrounding areas and could indicate a high site density. The Rio Salado has 51 sites recorded. There are 74 sites in BLM site files that are located in the Rio Grande Valley. The Chupadera Wash-Jornada del Muerto area contains 78 recorded sites. Allotments located in high site density areas are listed in Table 2-32.

### CONDITION OF SITES

The 129 sites recorded during the New Mexico State University surveys are in various stages of deterioration. Site conditions are as follows: Excellent - 2, Good - 68, Fair/Good - 5, Fair - 31, Poor/Fair - 4, Poor - 17, Indeterminate - 2. (The condition of these two sites cannot be determined due to rockfall.)

Causes affecting the condition of sites are shown in Table 2-33. 'Natural Detrimental' causes are those forces destroying a site excluding erosion. This includes packrat nests, juniper trees, etc. Erosion is affecting the greatest percentage of sites (40 percent); the amount of erosion varies from slight to severe. Only two sites in the survey were recorded as having been vandalized.

Due to inconsistencies or lack of information, the condition of sites recorded in the literature search cannot be adequately discussed. Several sites have experienced severe vandalism, including bulldozing. The rate of vandalism is believed to be greater than reflected by the survey data. Reasons for this difference are accessibility and visibility of sites. Areas that received systematic surveys are often away from population centers and heavily used roads, and the sites are usually campsites or small rubble mounds. In areas where no such surveys occurred, there are large, easily identifiable, puebloan rubble mounds.

Erosion is presently the most significant source of cultural resource deterioration. The rate of erosion on sites is difficult to predict. Erosion would cause vertical and horizontal displacement of artifacts as well as site destruction. (Table 2-34)

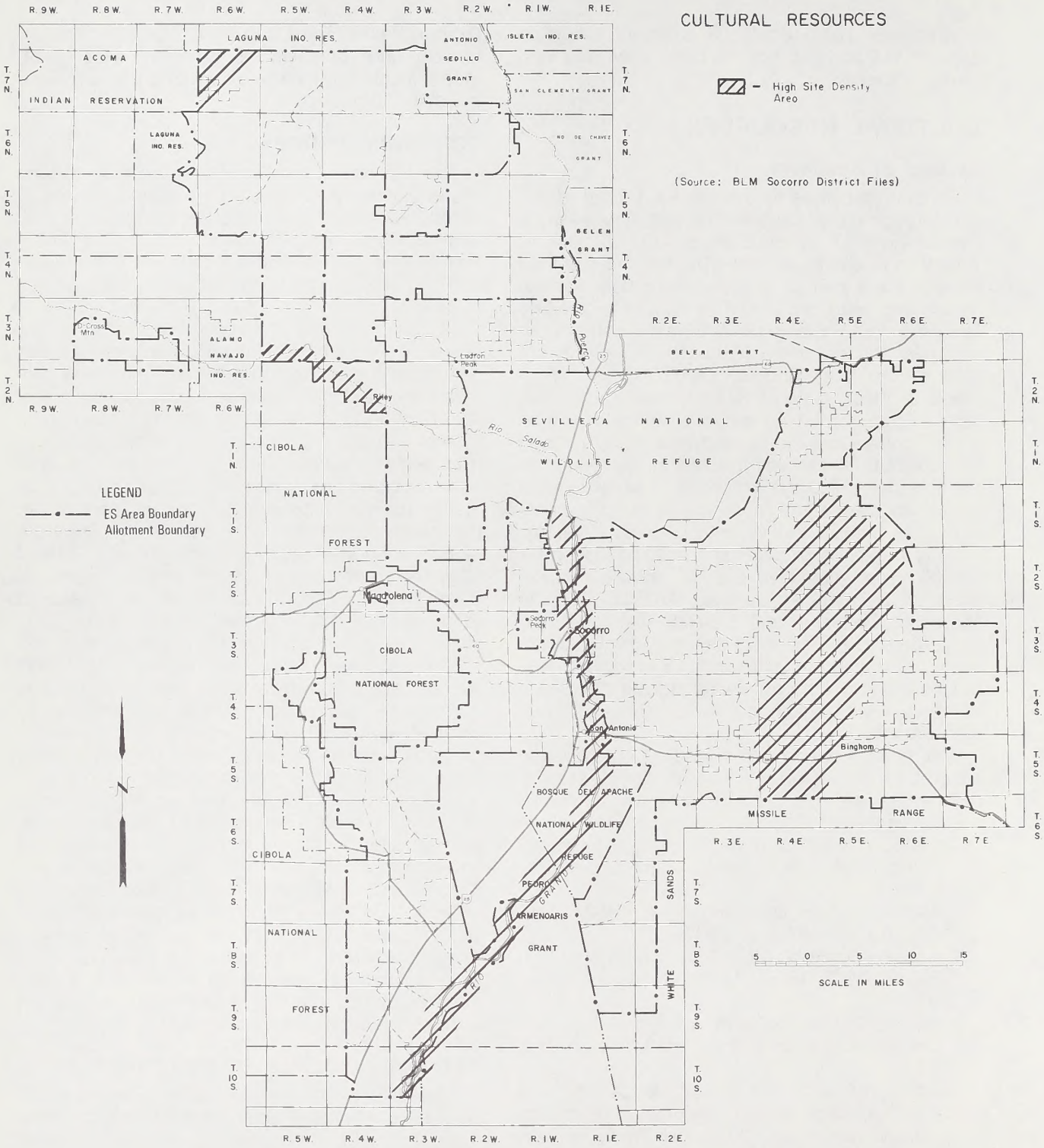
Table 2-34 shows the acres of various sediment yield classes in the high site density areas. Any erosion occurring in these areas would be more likely to damage sites. Areas in the severe sediment yield class are river washes and badlands; it is improbable that sites would exist here.

### NATIONAL REGISTER OF HISTORIC PLACES

According to the current listing of the National Register of Historic Places (Federal Register, February 7, 1978), there are no National Register properties on public land within the ES Area.

Requests for determination of eligibility for nomination to the National Register and the responses of the State Historic Preservation Officer (SHPO) are on file at the Socorro District Office. Sites on public land that have been determined by the SHPO to be eligible for nomination are:

Riley Spring Archaeological District




**MAP 2-10.** Cultural Resources

TABLE 2-32

ALLOTMENTS IN HIGH SITE DENSITY AREAS

| Arroyo Colorado | Rio Salado | Rio Grande Valley | Chupadera Wash - Jornada del Muerto |
|---|---|---|---|
| 083 Big Sandy Wash | 012 Riley Community | 250 Milligan Gulch | 251 Harless |
| 090 Petoch Wash | 016 Puertecito & Barranco | 253 E. Vigil Ind. | 256 Llano |
| 129 Arroyo Colorado | 121 Rio Salado West | 255 Bosquecito | 260 Sierra Larga |
| 165 R. Lucero Ind. | | 258 Ojo de Amado | 266 Coyote Spring |
| | | 261 Sheep Canyon | 271 Mesa Redonda |
| | | 272 San Pasqual River | 275 Adobe, Hansenburg, Padilla |
| | | 277 San Jose Canyon | 284 Mesa Canyon Well |
| | | 279 Silver Canyon | 289 Jornada Community |
| | | 288 Rio Grande | 291 Prairie Spring |
| | | 302 Marshall Ind. | 301 Bennett-Wilson |
| | | 306 Veranito | 310 Orndorff Ind. |
| | | 312 La Arenosa | 325 West Williams |
| | | 318 Pueblito Comm. | 330 East Williams |
| | | 363 San Antonio | 340 Bishop Ind. |
| | | | 350 South Rainwater |
| | | | 352 Sais Ind. |
| | | | 360 Chupadera |

Source: BLM Socorro District Files

TABLE 2-33

CAUSES AFFECTING THE CONDITION OF SITES*

| Condition of Site | Natural Beneficial | Natural Detrimental | Erosion | Vandalism |
|---|---|---|---|---|
| Poor | | 5 | 13 | 1 |
| Poor-Fair | | | 5 | |
| Fair | 4 | 10 | 18 | |
| Fair-Good | 1 | 2 | 2 | 1 |
| Good | 33 | 24 | 17 | |
| Excellent | | 1 | 1 | |
| Indeterminate | 2 | 1 | | |

* Total adds up to more than the total number of sites (129) because some sites are experiencing more than one source of deterioration

Source: BLM Socorro District Files

TABLE 2-34

ACRES OF SEDIMENT YIELD CLASSES IN HIGH SITE DENSITY AREAS

| | Stable | Slight | Moderate | Critical | Severe /1 | Unknown |
|---|---|---|---|---|---|---|
| Existing Environment /2 | | | | | | |
| Arroyo Colorado | 0 | 1,341 | 7,569 | 2,574 | 0 | 28 |
| Rio Salado | 0 | 25 | 6,282 | 7,130 | 830 | 0 |
| Rio Grande | 0 | 13,771 | 7,935 | 715 | 4,001 | 0 |
| Chupadera | 0 | 82,312 | 69,915 | 10,597 | 1,575 | 194 |
| TOTAL | 0 | 97,449 | 91,701 | 21,016 | 6,406 | 222 |
| Proposed Action /2 | | | | | | |
| Arroyo Colorado | 0 | 5,748 | 3,724 | 2,012 | 0 | 28 |
| Rio Salado | 0 | 46 | 6,261 | 7,130 | 830 | 0 |
| Rio Grande | 0 | 18,681 | 3,025 | 715 | 4,001 | 0 |
| Chupadera | 0 | 125,015 | 34,112 | 3,697 | 1,575 | 194 |
| TOTAL | 0 | 149,490 | 47,122 | 13,554 | 6,406 | 222 |
| No Action Alternative/Future Environment /2 | | | | | | |
| Arroyo Colorado | 0 | 1,581 | 7,395 | 2,508 | 0 | 28 |
| Rio Salado | 0 | 24 | 6,283 | 7,130 | 830 | 0 |
| Rio Grande | 0 | 15,315 | 6,391 | 715 | 4,001 | 0 |
| Chupadera | 0 | 82,415 | 69,812 | 10,597 | 1,575 | 194 |
| TOTAL | 0 | 99,335 | 89,881 | 20,950 | 6,406 | 222 |
| Livestock Adjustment Alternative /2 | | | | | | |
| Arroyo Colorado | 0 | 5,748 | 3,724 | 2,012 | 0 | 28 |
| Rio Salado | 0 | 46 | 6,261 | 7,130 | 830 | 0 |
| Rio Grande | 0 | 18,681 | 3,025 | 715 | 4,001 | 0 |
| Chupadera | 0 | 119,176 | 39,951 | 3,697 | 1,575 | 194 |
| TOTAL | 0 | 143,651 | 52,961 | 13,554 | 6,406 | 222 |
| Pasture Capacity Level/Enhancement of Sensitive Resource Values Alternatives /2 | | | | | | |
| Arroyo Colorado | 0 | 5,932 | 4,107 | 1,445 | 0 | 28 |
| Rio Salado | 0 | 2,242 | 9,797 | 1,398 | 830 | 0 |
| Rio Grande | 621 | 18,060 | 3,025 | 715 | 4,001 | 0 |
| Chupadera | 0 | 128,104 | 31,023 | 3,697 | 1,575 | 194 |
| TOTAL | 621 | 154,338 | 47,952 | 7,255 | 6,406 | 222 |
| No Grazing Alternative /2 | | | | | | |
| Arroyo Colorado | 0 | 8,910 | 2,574 | 0 | 0 | 28 |
| Rio Salado | 15 | 6,292 | 6,169 | 961 | 830 | 0 |
| Rio Grande | 11,727 | 9,979 | 0 | 715 | 4,001 | 0 |
| Chupadera | 46,909 | 103,887 | 8,331 | 3,697 | 1,575 | 194 |
| TOTAL | 58,651 | 129,068 | 17,074 | 5,373 | 6,406 | 222 |

/1 Severe includes riverwash which does not fall into any range site. Therefore, it is not included in the severe sediment yield class of the Soils Section, but it can safely be included in the severe class.
/2 Total acreage for high site density area is 216,794 for each alternative.

Source: BLM Socorro District Files

Mockingbird Paleo-Indian Archaeological District
NM-02-205
NM-02-231 7NM-02-348
NM-02-380
NM-02-381
NM-02-382
NM-02-383
NM-02-496

A 106 Statement has been prepared in compliance with the National Historic Preservation Act of 1966. This document addresses impacts of the Proposed Action and alternatives on those sites determined eligible for the National Register. The SHPO has reviewed the affects of the Proposed Action and alternatives on the sites determined eligible for the National Register. His concurrence with the project design features and mitigating measures is documented in the 106 Statement. This can be reviewed at the Socorro District Office.

### *Future Environment*

Trampling and rubbing impacts would continue as in the Existing Environment except for the 25 allotments with AMPs. There would be an increase of 1,886 acres (2 percent) in the number of slight erosion acres and a decrease of 1,820 acres (2 percent) in moderate erosion acres.

Surface disturbance related to range developments is expected on 8 of the 25 existing AMPs (Appendix 1, Table A-2, p. A-18). No known sites would be impacted from construction of these range developments.

Indirect impacts are those caused by secondary uses. For example, a road may avoid all sites, but it could provide better access to sites by vandals.

### *Impacts*

#### DISTURBANCE

Grazing cattle disturb cultural resources by trampling and rubbing. Artifacts are chipped and broken; this type of modification is more significant for lithic than for ceramic artifacts. Structures are disturbed by cattle rubbing against them. This disturbance is difficult to quantify. Greatest disturbance would occur in areas of greatest cattle activity; these include watering areas and paths along fences.

The rate of soil erosion is related to erosion of sites. Analysis of the survey data shows that 40 percent of the sites are experiencing erosion. The rate of erosion varies from slight to severe. Of the sites experiencing erosion, 24 percent are in poor condition.

Table 2-34 shows the acres of various sediment yield classes in high site density areas. This involves about 217,000 acres of land in the Arroyo Colorado, Rio Salado, Rio Grande Valley, and Chupadera Wash - Jornada del Muerto areas. Only high site density areas were calculated because erosion's greatest impact would occur there. Soils in the severe sediment yield class are mostly river washes and badlands and are not likely to contain sites. (See Soils Section for more detail).

By disturbing the surface, construction of range developments would impact cultural resources occurring in the disturbed area. The degree of impacts is dependent on type of project and site density. For example, a pipeline going through a multi-component pueblo would have a greater impact than a fence. The same project would have less impacts if the site was an eroded campsite with only one occupation. Also, any project would have a greater chance of impacting a site in a high site density area.

A comparison of all proposed range developments and known sites was made. Table 1-4 shows the number of proposed projects and the acreage to be disturbed. Of the total projects shown in that table, 13 miles of pipeline, 27 miles of fence, and 80 acres around springs have been surveyed. No sites were found.

Indirect impacts are those caused by secondary uses. For example, a road may avoid all sites, but it could provide better access to sites by vandals.

**Proposed Action** - Trampling and rubbing would increase around the proposed 79 water troughs and 214 miles of fence. Also, while there would be an overall short-term reduction from 170,697 to 119,465 AUMs, the number of cattle in each pasture would generally increase over existing numbers due to the resting of pastures. The long-term increase to 173,916 AUMs would increase site damage, but the increased vegetation would add some protection. This would be a long-term, local impact.

There would be a 36-percent reduction in the number of critical sediment yield acres from the existing situation. There would be an increase of 52,041 acres (or 53 percent) in the slight erosion class. This would decrease the rate of erosion on sites. This would be a long-term, local impact. Based on present survey data no known sites would be directly impacted by developments. Future surveys may identify impacts. Also, there could be indirect impacts.

**No Action Alternative** - Trampling and rubbing impacts would continue as in the Existing Environment except for the 25 AMP allotments. On these allotments there could be a short-term decrease for this kind of disturbance resulting from a decrease from 170,697 to 159,025 AUMs, but increased cattle numbers per pasture would increase disturbance. Also, trampling and rubbing would increase near the proposed 18 water

troughs and 14 miles of fence. This would be a long-term, local impact.

There would be an increase of 1,886 acres (2 percent) in the number of slight sediment yield acres and a decrease of 1,820 acres (2 percent) in moderate sediment yield acres. This would be a long-term, local impact.

Based on present survey data, no known sites would be directly impacted from projects. Future surveys, however, may identify impacts. Also, there could be indirect impacts.

**Livestock Adjustment Alternative** - There would be increased trampling and rubbing adjacent to the proposed 18 water troughs and 14 miles of fences. Overall impacts from trampling and rubbing would decrease. There would be a sharp decrease with the short-term reduction from 170,697 to 119,465 AUMs followed by an increase to 165,736 AUMs. This would be a long-term, local impact.

There would be a 47-percent increase in slight sediment yield acres over the existing situation in high site density areas. Moderate and critical sediment yield classes would decrease 42 and 36 percent, respectively, from the existing situation. This would be a long-term, local impact.

Based on present survey data, no known sites would be directly impacted by construction of range developments. Future surveys, however, may identify impacts. Also, there could be indirect impacts.

**Pasture Capacity Level Alternative** - Trampling and rubbing would increase around the proposed 79 water troughs and 214 miles of fences. Short-term impacts would be reduced by a decrease in AUMs from 170,697 to 97,036. Long-term disturbance would increase above the existing situation as AUMs increase to 205,665. This is a long-term, local impact.

In the slight sediment yield class there would be a 58-percent increase (or 56,889 acres) over the existing situation. Moderate and critical sediment yield classes would decrease by 48 (43,749 acres) and 66 percent (13,761 acres), respectively, from the existing situation. This would be a long-term, local impact.

Based on present survey data, no known sites would be directly impacted by construction of range developments. Future surveys, however, may identify impacts. Also, there could be indirect impacts.

**Enhancement of Sensitive Resource Values Alternative** - Trampling and rubbing would increase around the proposed 79 water troughs and 241 miles of fence. With a decrease from 170,697 to 81,901 AUMs, trampling and rubbing impacts would also decrease. The long-term AUM number of 209,620 would mean increased trampling. This would be a long-term, local impact.

In the slight sediment yield class there would be a 58-percent increase (or 56,889 acres) over the existing situation. Moderate and critical sediment yield classes would decrease by 48 (43,749 acres) and 66 percent (13,761 acres), respectively, from the existing situation. This would be a long-term, local impact.

Based on present survey data, no known sites would be directly impacted by construction of range developments. Future surveys, however, may identify impacts. Also, there could be indirect impacts.

**No Grazing Alternative** - This would eliminate all trampling and rubbing impacts on public land due to cattle. This would be a long-term, local impact.

The stable sediment yield class would increase from the present zero acres to 58,651 acres. Soils in the slight sediment yield class would increase by 33 percent over the present situation. In the total high site density area 87 percent of the acres would be in stable and slight sediment yield classes. This would be a long-term, local impact.

There would be no direct or indirect impacts from construction of range developments.

## CUMULATIVE IMPACTS

**Proposed Action** - Increased cattle numbers in the long term would increase trampling and rubbing; however, improved vegetation would add some protection. Erosion damage would decrease. No known sites would be impacted from construction of range developments but future surveys could identify sites that would be impacted.

**No Action Alternative** - On the existing 25 AMP allotments increased cattle numbers would increase trampling and rubbing; however, improved vegetation would add some protection. Erosion damage would decrease on these same allotments. No known sites would be impacted from construction of range developments; but future surveys could identify sites that would be impacted. Impacts on non-AMP allotments would continue at the existing situation.

**Livestock Adjustment Alternative** - Increased cattle numbers in the long term would increase trampling and rubbing; however, improved vegetation would add some protection. Erosion damage would decrease. No known sites would be impacted from construction of range developments, but future surveys could identify sites that would be impacted.

**Pasture Capacity Level Alternative** - Increased cattle numbers in the long term would increase trampling and rubbing; however, im-

proved vegetation would add some protection. Erosion damage would decrease. No known sites would be impacted from construction of range developments, but future surveys could identify sites that would be impacted.

**Enhancement of Sensitive Resource Values Alternative** - Increased cattle numbers in the long term would increase trampling and rubbing; however, improved vegetation would add some protection. Erosion damage would decrease. No known sites would be impacted from construction of range developments, but future surveys could identify sites that would be impacted.

**No Grazing Alternative** - Impacts from trampling and rubbing would be eliminated. Erosion damage would decrease. There would be no impacts from construction of range developments.

### *Mitigating Measures*

Specific mitigating measures are to be identified in the site specific EARs if impacts are identified.

### *Unavoidable Adverse Impacts*

It is expected that disturbance would occur as a result of trampling and erosion. Trampling impacts cannot be completely avoided if objectives are to be met. The effects of deterioration due to erosion would be reduced by an unknown amount but cannot be eliminated altogether.

Disturbance to subsurface sites not discovered during pre-construction surveys would be almost certain to occur. In cases where salvage is required, the impact would not be fully mitigated. Salvage of cultural resources is an unavoidable adverse impact. Once excavated, a site is effectively destroyed and removed from future research considerations which may utilize new techniques. Salvage is rarely as effective as non-salvage research programs, partially because of time limitations, funding, and personnel competence. Emergency salvage, required by unexpected discoveries during project initiations, would be even less effective.

### *Irreversible and Irretrievable*

Proposed livestock grazing and development of facilities could disturb certain cultural resources. Once disturbed, historical and archaeological sites as well as artifacts would no longer be available for future study. This could result in a data gap in the history of an area and would be considered an irretrievable commitment.

Any excavation, damage, pot-hunting, or stripping done to any historical site or archaeological resource would be an irreversible and irretrievable commitment of these non-renewable resources.

## RECREATION

### *Existing Environment*

#### SIGHTSEEING

The 838,808 acres of public land in the ES Area possess a variety of scenic resources. Sightseeing opportunities range from birdwatching and wildlife observation to general landscape viewing. Sightseeing use of the area may occur as a singular recreation pursuit, but it generally accompanies recreation activities such as hunting, camping, hiking, picnicking, and photography. To provide a perspective for evaluation, the scenic resources of the ES Area were compared to those of a larger area. The area of comparison for the evaluation of the scenic resources is a 100-mile radius from Socorro (Map 2-11).

The ES Area has an interesting mix of scenic resources such as low-lying bosque lands, creosote terraces, grasslands, and high mesa-mountain topography (Figures 2-12, 2-13, and 2-14). One can experience the wide open spaces by driving east of Socorro on the Jornada del Muerto plains. The northwestern portion of the area with its rugged mesa tops, sandstone bluffs, and desert mountains contrasts markedly with the flat to rolling rangelands to the south and east. A unique, highly scenic, 3,200-acre yucca area, 20 miles south of NM 380, has been identified by BLM for protection (Figure 2-15).

Scenic geologic resources of the area include San Lorenzo Canyon, Petaca Pinta, Tecolote Badlands, the Box, the Rio Salado Canyons, Ladron Mountain, and Nogal Canyon (Map 2-12). For a more detailed evaluation and listing of the scenic resources, refer to Ladron and Stallion URAs.

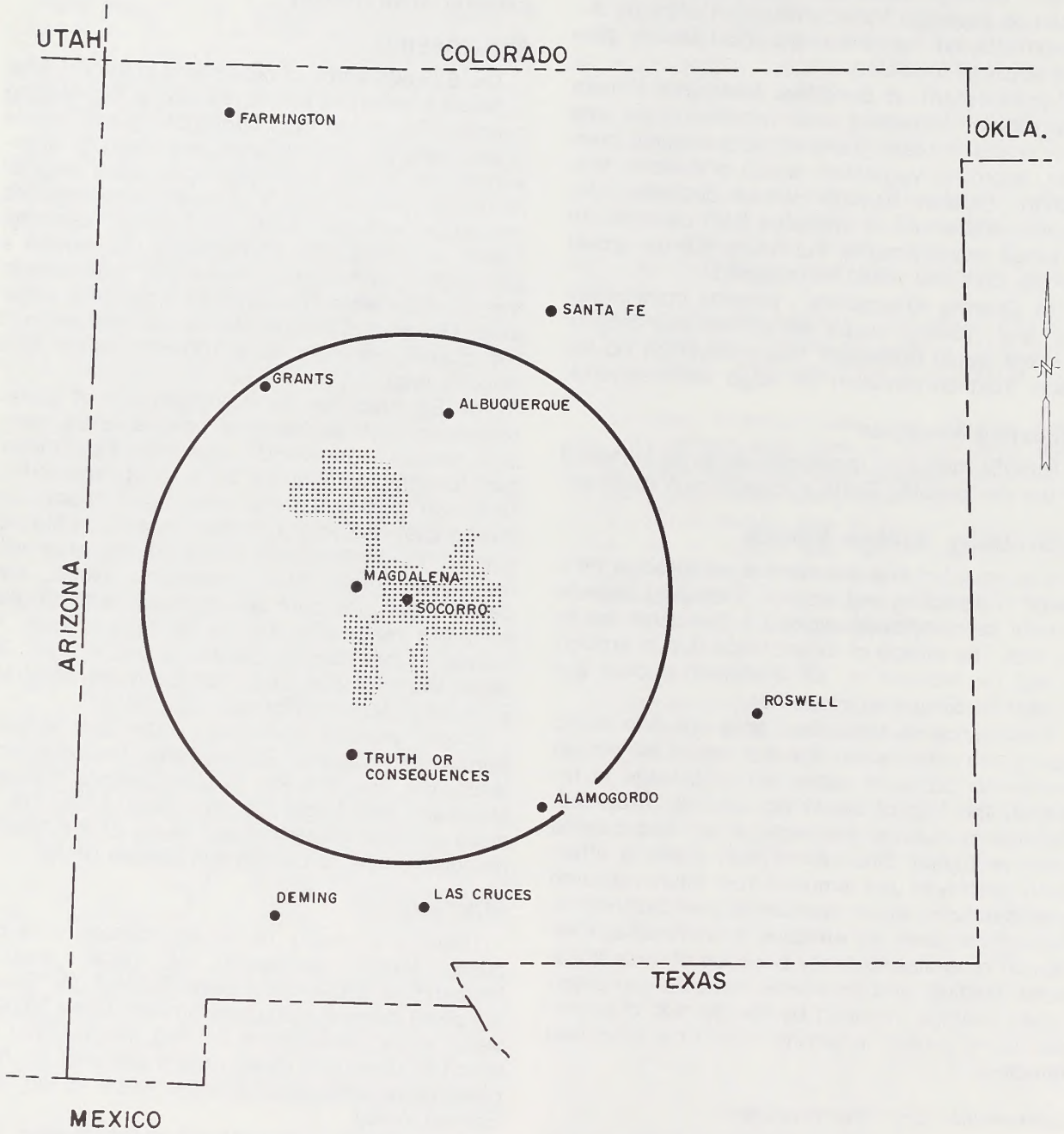
#### HUNTING

There is a variety of hunting opportunities on public lands. Estimated big game hunting 'demand' is 5,919 visitor days (Table 2-35). Existing small game hunting is estimated to be 13,306 visitor days. Small game hunting, the majority of which is dove and quail, occurs primarily on the open range and along bosque lands in the Rio Grande Valley.

A significant portion of big game hunting involves deer. The 1975 deer hunters in the ES Area totaled 2,146 (NMDG&F 1975 Performance Report). Several antelope hunts are conducted during specified years in designated areas. During 1977, for example, NMDG&F issued 86 antelope permits on 8 allotments in the ES Area.

#### ORV USE

The majority of ORV use is on private, State, and scattered parcels of public land that comprise




## Area of Comparison

(Source - BLM Socorro District Files)

**MAP 2-11.** Area of Comparison for Scenic Quality Evaluations

Figure 2-12. Creosote terraces

Figure 2-13. Grasslands

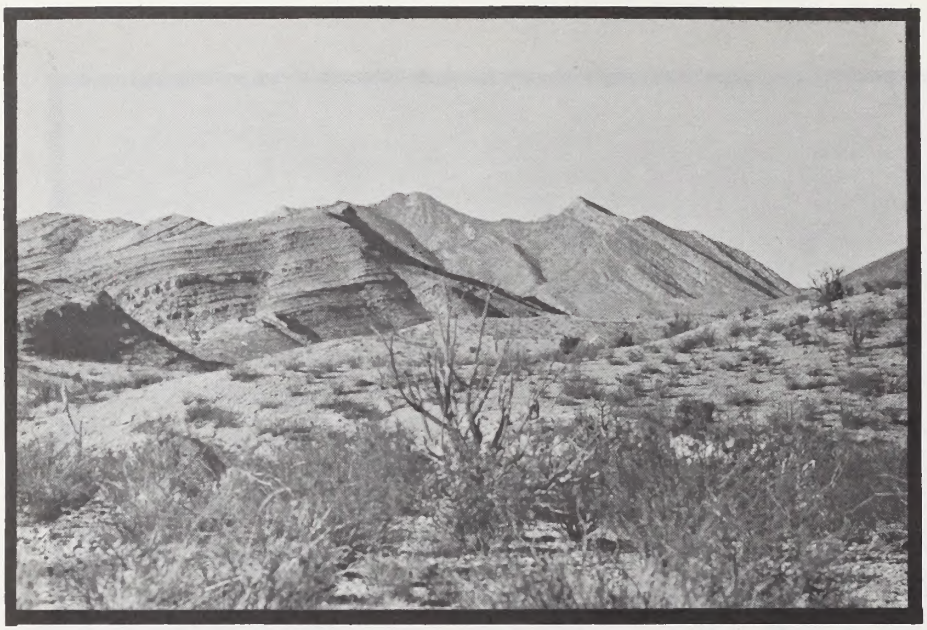


Figure 2-14. Mesa mountain topography

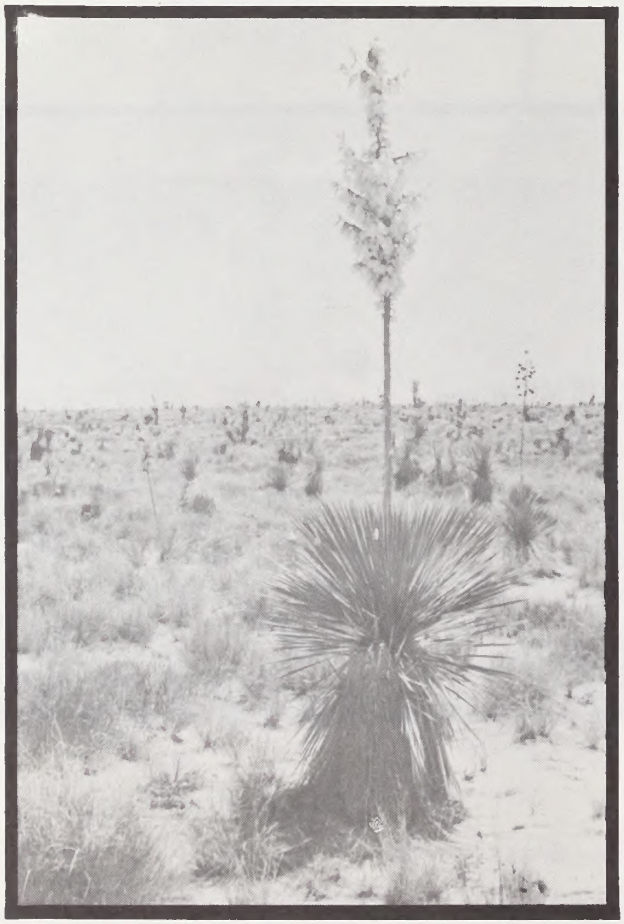
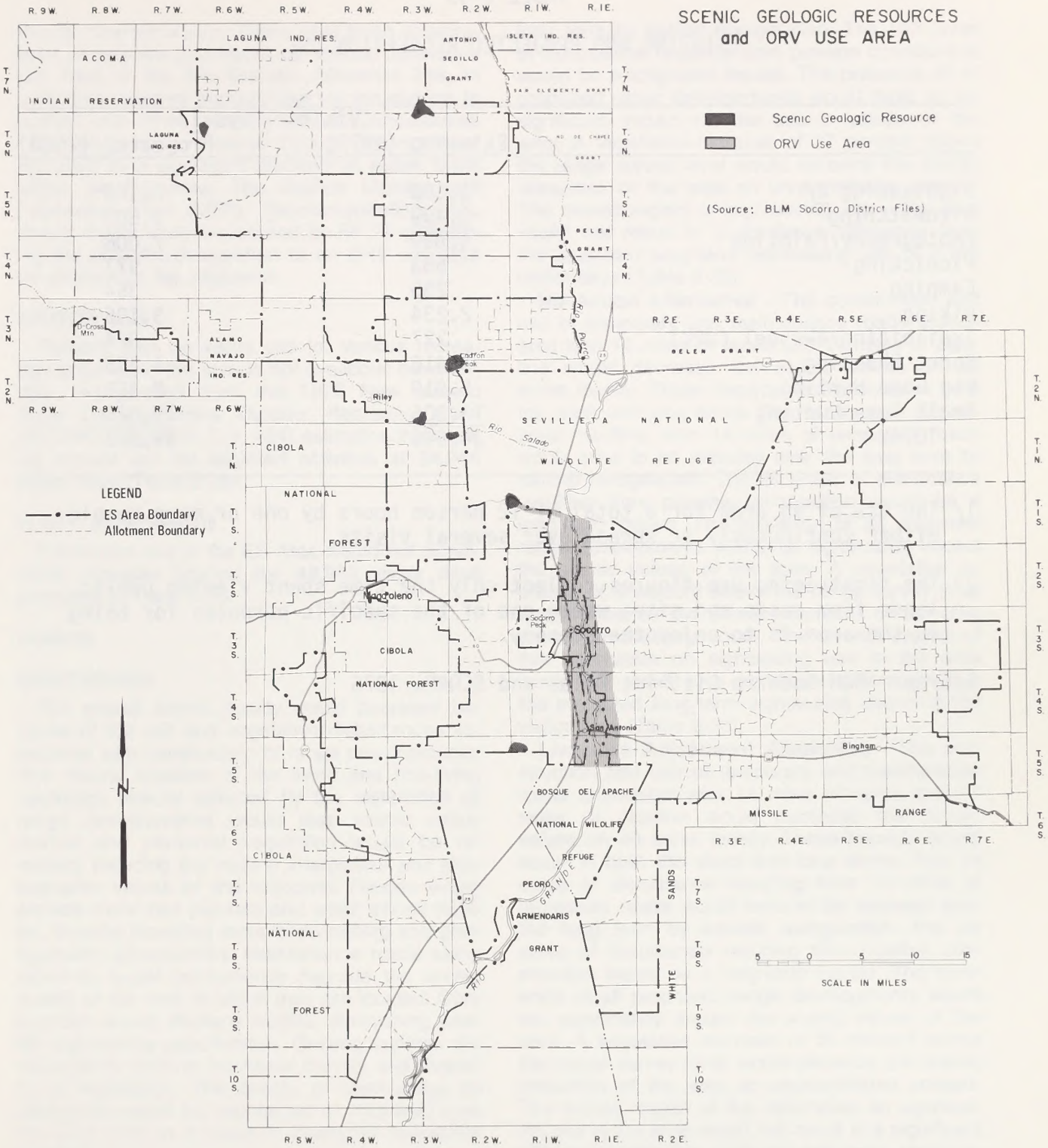


Figure 2-15. Scenic yucca area




**MAP 2-12.** Scenic Geologic Resources and ORV Use Area

TABLE 2-35

EXISTING AND PROJECTED RECREATION USE

| | Visitor Days 1/ | |
|---|---|---|
| | Existing (1977) | Projected (2000) |
| Sightseeing 2/ | 1,508 | 2,156 |
| Birdwatching | 2,499 | 3,503 |
| Photography/Painting | 4,899 | 7,006 |
| Picnicking | 683 | 977 |
| Camping | 255 | 364 |
| Hiking | 2,234 | 3,195 |
| Trailbiking/4-wheel (ORV) | 227 | 324 |
| Sport Shooting | 3,416 | 4,885 |
| Big Game Hunting | 5,919 | 8,465 |
| Small Game Hunting | 13,306 | 19,028 |
| TOTAL | 34,946 | 49,903 |

1/ The use of an area for a total of 12 person hours by one or more people, either continuously or spread over several visits.

2/ The sightseeing use figures reflect only the time spent viewing public lands from roads and sites where one of the specific purposes for being in the area is to enjoy the scenery.

Source: BLM Socorro District Files and SCORP, 1976

the Rio Grande Valley. There have been observations of vehicles and tracks on several allotments just east of the Rio Grande. Allotment 318, in particular, receives frequent use yet not enough to conflict with other resource values. Concentrated ORV use causing resource damage has not been identified as a significant problem on public lands within the ES Area. The Stallion Management Framework Plan (MFP), Recommendation 11.1, directs that a study be initiated by FY 78 concerning the possible designation of an ORV use area on portions of this allotment.

### VISITOR USE

Reliable data on visitor use for various recreation activities in the area is not available; however, data extrapolated from the 1976 New Mexico State Comprehensive Outdoor Recreation Plan (SCORP) (Appendix 7, p. 104) estimates the existing annual use for selected activities at 34,946 visitor days (Table 2-35).

#### *Future Environment*

Recreation use in the ES Area would not significantly increase beyond the 49,903 visitor days projected in Table 2-35.

#### *Impacts*

### SIGHTSEEING

The overall scenic quality would decrease because of the soil and vegetative disturbances associated with construction of range developments. The natural qualities of the living and non-living resources directly affected by the installation of range developments would lose scenic value. Annual and perennial vegetation would be removed, reducing the natural interpretive and photographic values of the resource. Fences would provide more bird perches and small animal habitat, thereby providing more birdwatching and photographic opportunities. Maintenance roads along pipelines would permanently degrade the scenic quality of the area in which they are located. Construction would displace wildlife, diminishing wildlife sightseeing opportunities. Grazing systems are expected to provide increased density and diversity of vegetation. The quality of sightseeing on allotments would be maintained or improved over the long term as a result of increased vegetative production.

**Proposed Action** - The construction and use of temporary and maintenance roads associated with 214 miles of fence and 89 miles of pipeline would decrease the scenic values locally on 347 acres in the short term. The 214 acres of disturbance resulting from 214 miles of temporary roads would be approximately 80-percent restored over the long term by natural revegetation. The 133 acres of disturbance resulting from pipeline construction would be a long-term impact. The presence of all proposed range developments would have an insignificant impact on the scenic values of the area. A vegetative increase of 37 percent above the range survey level would enhance the scenic resources of the area an unquantifiable amount. The overall impact on sightseeing use in the area would not result in a significant difference from the projected long-term sightseeing use of 2,156 visitor days (Table 2-35).

**No Action Alternative** - The construction and use of temporary and maintenance roads associated with 14 miles of fence and 17 miles of pipeline would decrease the scenic values on 40 acres locally. These impacts would occur in both the short and long terms. The 14 acres of disturbance resulting from 14 miles of temporary roads would tend to be restored over the long term by natural revegetation. The 26 acres of disturbance resulting from pipeline construction would be a long-term impact. The presence of all proposed range developments would not significantly impact the scenic values of the area. A vegetative increase of 9 percent above the range survey level would enhance the scenic resources of the area an unquantifiable amount. The overall impact of this alternative on sightseeing use in the area would not result in a significant difference from the projected long-term sightseeing use of 2,156 visitor days (Table 2-35).

**Livestock Adjustment Alternative** - The construction and use of temporary and maintenance roads associated with 14 miles of fence and 17 miles of pipeline would decrease the scenic values on 40 acres locally. These impacts would occur in both the short and long terms. The 14 acres of disturbance resulting from 14 miles of temporary roads would tend to be restored over the long term by natural revegetation. The 26 acres of disturbance resulting from pipeline construction would be a long-term impact. The presence of all proposed range developments would not significantly impact the scenic values of the area. A vegetative increase of 30 percent above the range survey level would enhance the scenic resources of the area an unquantifiable amount. The overall impact of this alternative on sightseeing use in the area would not result in a significant difference from the projected long-term sightseeing use of 2,156 visitor days (Table 2-35).

**Pasture Capacity Level Alternative** - The construction and use of temporary and maintenance roads associated with 214 miles of fence and 89 miles of pipeline would decrease the scenic values locally on 347 acres in the short term. The 214 acres of disturbance resulting from 214 miles

of temporary roads would be approximately 80-percent restored over the long term by natural revegetation. The 133 acres of disturbance resulting from pipeline construction would be a long-term impact. The presence of all proposed range developments would have an insignificant impact on the scenic values of the area. A vegetative increase of 61 percent above the range survey level would enhance the scenic resources of the area an unquantifiable amount. The overall impact on sightseeing use in the area would not result in a significant difference from the projected long-term sightseeing use of 2,156 visitor days (Table 2-35).

**Enhancement of Sensitive Resource Values Alternative** - The impacts to scenic quality and sightseeing use in the area from this alternative would not significantly differ from those occurring under the Proposed Action, because the number of range developments has increased by only 26 miles of fence. The construction and use of temporary and maintenance roads associated with 241 miles of fence and 89 miles of pipeline would decrease the scenic values locally on 133 acres in the short term. The 241 acres of disturbance resulting from the construction of fences would be approximately 80-percent restored over the long term by natural revegetation. In the long term 89 acres of disturbance resulting from pipeline construction would persist. A vegetative increase of 64 percent above the range survey level would enhance scenic values an unquantifiable amount. The overall impact on sightseeing use in the area would not result in a significant difference from the projected long-term sightseeing use of 2,156 visitor days (Table 2-35).

**No Grazing Alternative** - The scenic values of the area would be diminished by the construction of 1,475 miles of fence on private lands. Access across private lands may be restricted; thereby, decreasing sightseeing use in the area. The impacts on sightseeing use would be local and long term. However, sightseeing use would not significantly differ from the projected use of 2,156 visitor days (Table 2-35).

### HUNTING

Improved access for hunting would result from new temporary and maintenance roads associated with new range developments. The slight increase projected under the Proposed Action and alternatives for wildlife populations would not be sufficient to meet the projected demands of 27,493 visitor days (Table 2-35). Therefore, the quality of hunting in the area would decrease with or without the Proposed Action or alternatives.

**Proposed Action** - Antelope numbers would increase from 648 to 763 in the long term. Deer numbers would remain at 1,333. Small game would increase an unquantifiable amount in the long term. The overall hunting use would not significantly differ from the long-term projections of 27,493 visitor days (Table 2-35).

**No Action Alternative** - Antelope numbers would increase from 648 to 665 in the long term. Deer numbers would remain at 1,333. Small game would increase an unquantifiable amount in the long term. The overall hunting use would not significantly differ from the long-term projections of 27,493 visitor days (Table 2-35).

**Livestock Adjustment Alternative** - Antelope numbers would increase from 648 to 712 in the long term. Deer numbers would remain at 1,333. Small game would increase an unquantifiable amount in the long-term. The overall hunting use would not significantly differ from the long-term projections of 27,493 visitor days (Table 2-35).

**Pasture Capacity Level Alternative** - Antelope numbers would increase from 648 to 773 in the long term. Deer numbers would remain at 1,333. Small game would increase an unquantifiable amount in the long term. The overall hunting use would not significantly differ from the long-term projections of 27,493 visitor days (Table 2-35).

**Enhancement of Sensitive Resource Values Alternative** - Antelope numbers would increase from 648 to 779 in the long term. Deer numbers would remain at 1,333. Small game would increase an unquantifiable amount in the long term. The overall hunting use would not significantly differ from the long-term projections of 27,493 visitor days (Table 2-35).

**No Grazing Alternative** - Antelope numbers would increase from 648 to 720 in the long term. Deer numbers would remain at 1,333. Small game would increase an unquantifiable amount in the long term. The overall hunting use would not significantly differ from the long-term projections of 27,493 visitor days (Table 2-35). Hunting use may be limited if private landowners restrict access across their lands. This would prevent entry to some public lands.

### ORV USE

ORV use areas would increase as a result of the additional temporary and maintenance roads. Continued use of roads for fence and pipeline maintenance would encourage ORV use. The projected increase in recreational use (Table 2-35) would result in additional unquantified ORV use.

**Proposed Action** - The vehicle tracks created during the construction of 214 miles of fence would encourage ORV use in the short term. The periodic and continual use of 89 miles of new roads for pipeline maintenance would provide for an increase in short- and long-term ORV use.

These impacts would be local and would not be a significant increase beyond the long-term projections of 324 visitor days (Table 2-35).

**No Action Alternative** - The vehicle tracks created during the construction of 14 miles of fence would encourage ORV use in the short term. The periodic and continual use of 17 miles of new roads for pipeline maintenance would provide for an increase in short- and long-term ORV use. These impacts would be local and would not be a significant increase beyond the long-term projections of 324 visitor days (Table 2-35).

**Livestock Adjustment Alternative** - The vehicle tracks created during the construction of 14 miles of fence would encourage ORV use in the short term. The periodic and continual use of 17 miles of new roads for pipeline maintenance would provide for an increase in short- and long-term ORV use. These impacts would be local and would not be a significant increase beyond the long-term projections of 324 visitor days (Table 2-35).

**Pasture Capacity Level Alternative** - The vehicle tracks created during the construction of 214 miles of fence would encourage ORV use in the short term. The periodic and continual use of 89 miles of new roads for pipeline maintenance would provide for an increase in short- and long-term ORV use. These impacts would be local and would not be a significant increase beyond the long-term projections of 324 visitor days (Table 2-35).

**Enhancement of Sensitive Resource Values Alternative** - The vehicle tracks created during the construction of 241 miles of fence would encourage ORV use in the short term. The periodic and continual use of 89 miles of new roads for pipeline maintenance would provide for an increase in short- and long-term ORV use. These impacts would be local and would not be a significant increase beyond the long-term projections of 324 visitor days (Table 2-35).

**No Grazing Alternative** - The vehicle tracks created during the construction of 1,475 miles of fence would encourage ORV use in the short term. Access to public land may be restricted if private landowners deny access across their lands.

### CUMULATIVE IMPACTS

**Proposed Action** - The overall impact on sightseeing, hunting, and ORV use would not result in significant differences from long-term projections in Table 2-35.

**No Action Alternative** - There would be no discernible impact on recreation use. Recreation use would continue at the existing and projected levels (Table 2-35). The overall impact of this alternative on recreation use would be insignificant.

**Livestock Adjustment Alternative** - The overall impact on sightseeing, hunting, and ORV use would not result in significant differences from long-term projections in Table 2-35.

**Pasture Capacity Level Alternative** - The overall impact on sightseeing, hunting, and ORV use would not result in significant differences from those long-term projections in Table 2-35.

**Enhancement of Sensitive Resource Values Alternative** - The overall impact on sightseeing, hunting, and ORV use would not result in a significant difference from the long-term projections in Table 2-35.

**No Grazing Alternative** - The overall impact on sightseeing, hunting, and ORV use would not result in a significant difference from the long-term projections in Table 2-35.

### *Unavoidable Adverse Impacts*

During the construction of range developments, and for a short time thereafter, sightseeing values would be diminished near soil and vegetative disturbances. Natural sightseeing values would be impaired to a minor degree by the continued presence of range developments.

## VISUAL RESOURCES

### *Existing Environment*

### VISUAL RESOURCE MANAGEMENT SYSTEM

BLM has implemented a visual inventory and analysis process to provide for a systematic interdisciplinary approach in the management of aesthetic values on public lands. Visual resource management (VRM) is integrated into BLM's Planning and Environmental Systems to implement resource management activities while minimizing adverse impacts to the visual resources. The VRM system inventories existing scenic quality and assigns visual management categories based on a combination of scenic values, visual sensitivity, and viewing distance zones. This provides for a systematic visual evaluation of proposed resource management activities to ensure they meet the visual quality of the landscape on which they occur (Appendix 8, p. A-106).

### VISUAL RESOURCE MANAGEMENT CLASSES

BLM has five VRM classes (Table 2-36) to provide guidance in ascertaining the degree of modification acceptable to the landscape affected by proposed management activities. Map 2-13 shows the distribution of all VRM classes in the ES Area. Most of the public lands (98 percent) in the ES Area are Classes III and IV (Table 2-37). Figures

TABLE 2-36

VISUAL RESOURCE MANAGEMENT CLASSES

Class I - This class primarily provides for natural ecological changes only. It is applied to primitive areas, some natural areas, and other similar situations where management activities are to be restricted.

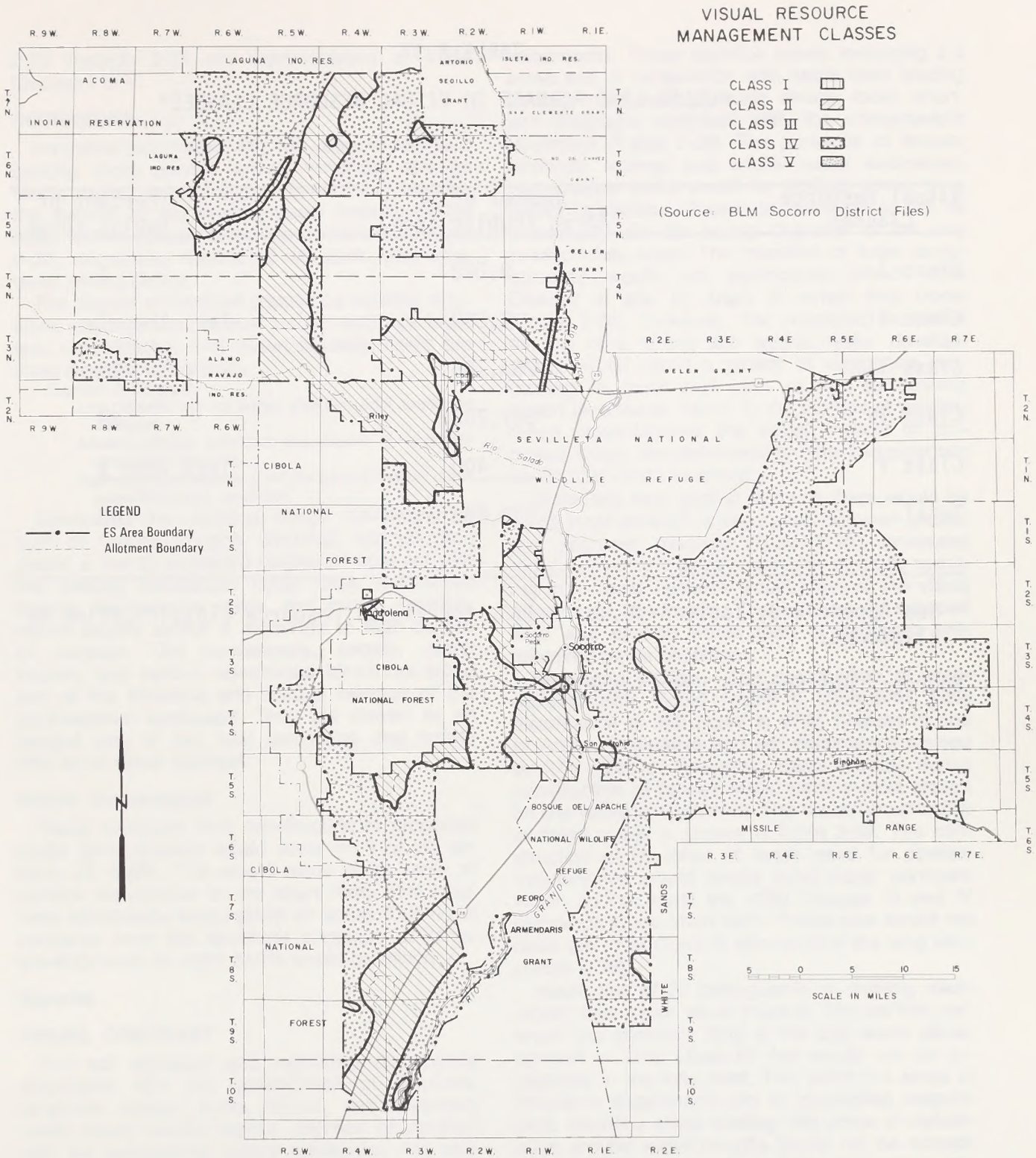
Class II - Changes in any of the basic elements (form, line, color, or texture) caused by a management activity should not be evident in the characteristic landscape.

Class III - Changes in the basic elements (form, line, color, texture) caused by a management activity may be evident in the characteristic landscape. However, the changes should remain subordinate to the visual strength of the existing character.

Class IV - Changes may subordinate the original composition and character but must reflect what could be a natural occurrence within the characteristic landscape.

Class V - Change is needed. This class applies to areas where the naturalistic character has been disturbed to a point where rehabilitation is needed to bring it back into character with the surrounding countryside. This class would apply to areas identified in the scenery evaluation where the quality class has been reduced because of unacceptable intrusions. It should be considered an interim short-term classification until one of the other objectives can be reached through rehabilitation or enhancement. The desired visual quality objective should be identified.

Source: BLM Manual 6310.18




**MAP 2-13.** Visual Resource Management Classes

TABLE 2-37

PUBLIC LAND ACREAGE IN VISUAL RESOURCE CLASSES*

| Visual Resource Classes | Number of Acres (Public Land) | Percent of Public Lands |
|---|---|---|
| Class I | 9,040 | 1 |
| Class II | 2,880 | less than 1 |
| Class III | 258,706 | 29 |
| Class IV | 567,782 | 69 |
| Class V | 400 | less than 1 |
| Total | 838,808 | 100 |

* See Appendix 8, Table A-40, p. A-113, for visual resource classification by allotment.

Source: BLM Socorro District Files

2-16 through 2-21 are representative of VRM Classes I to V.

**INTRUSIONS**

Intrusions associated with 100 years of livestock grazing, stock ponds, fences, windmills, storage tanks, roads, and buildings (Figure 2-21) produce the majority of the existing visual impacts (Table 2-38). Other intrusions include powerlines (Figure 2-20), microwave towers, oil drill pads, and scattered mining claims.

The degree of contrast created by existing intrusions depends on various factors such as location, rehabilitation, and materials used. There are three degrees of contrast.

*Degrees of Contrast*

*Low-Contrast will not attract attention from landscape character.*

*Medium-Attracts attention and begins to dominate landscape character.*

*High-Demands attention, will not be overlooked, dominates landscape character.*

Generally, the existing range developments such as fences, troughs, windmills, springs, etc., create a low to moderate degree of contrast with the existing landscape. Utility lines, microwave towers, maintenance roads, and mining developments usually exhibit a moderate to high degree of contrast. Old homesteads, corrals, ranch houses, and various abandoned structures are a part of the historical and cultural heritage of the southwestern landscape. They are viewed as an integral part of the total landscape and create little to no visual contrast.

***Future Environment***

Visual contrasts from construction of proposed range developments would occur on 8 of the existing 25 AMPs. This would result in 90 acres of surface disturbance in the short term. The long-term disturbance would affect 67 acres. The visual contrasts from the structural presence of range developments on eight AMPs would be minor.

***Impacts***

**VISUAL CONTRAST**

The soil exposure and vegetative disturbance associated with the construction of pipelines, windmills, storage tanks, fences, and temporary roads would create varying degrees of contrast with the surrounding natural landscape. Any erosion resulting from these disturbances would tend to emphasize the contrasts. The number of acres disturbed, contrast rating, and acceptability of these developments to the VRM classes in which they occur is shown in Table 2-39. Soil exposure, initiated during construction of water troughs and the earthen reservoir, would be perpetuated by the concentration of cattle around the water developments. These sacrifice areas, averaging 2.5 acres and in conjunction with cattle trails leading to and from waters, create strong, local, short- and long-term contrasts with the characteristic landscape (Table 2-39). The presence of fences, windmills, springs and wildlife water exclosures, and storage tanks would be artificial forms on a natural landscape. These structures would not be in harmony with the natural character of the area in which they occur. The presence of water developments would not significantly affect VRM Classes III and IV Areas in which they occur (Table 2-39). However, the proposed protective fencing of a spring and wildlife water developments would cause a growth of vegetation contrasting in color and form to the surrounding desert landscape. Taken in the context of existing range developments, the visual impacts of proposed range developments on the characteristic landscape would be minor.

Under the new grazing systems there would be some local contrast in vegetation between grazed and ungrazed pastures (Table 2-39). Increased ground cover and plant community diversity resulting from these systems would improve the visual aspects of the range. The amount of exposed soils and erosion would tend to decrease with improved range condition.

**Proposed Action** - The construction of water developments would create a short-term, local disturbance of 365 acres in VRM Classes III and IV Areas. Vegetative and soil disturbance caused by 214 miles of temporary roads created during construction of fences would have a local impact on the visual environment. The visual acceptability of these roads is shown in Table 2-39. The construction of 89 miles of roads used for pipeline maintenance would create local visual contrasts which do not meet the VRM Classes III and IV standards in the short term. These also would not meet the VRM Class III standards in the long term (Table 2-39).

Installation of 22 cattleguards on existing roads would have minor visual impacts. The earthen reservoir (on allotment 290) is the only water development in VRM Class IV that would not be acceptable in the long term. This totals 0.5 acres of long-term disturbance and is considered insignificant. Sacrifice areas totaling 198 acres of disturbance around water troughs would not be acceptable to VRM Classes III and IV standards in the short and long terms.

**No Action Alternative** - Visual contrasts from construction of range developments would occur on 8 of the existing 25 AMPs. This would result in 90 acres of surface disturbance in the short term. The long-term disturbance would affect 67 acres. The visual contrasts from the presence of range

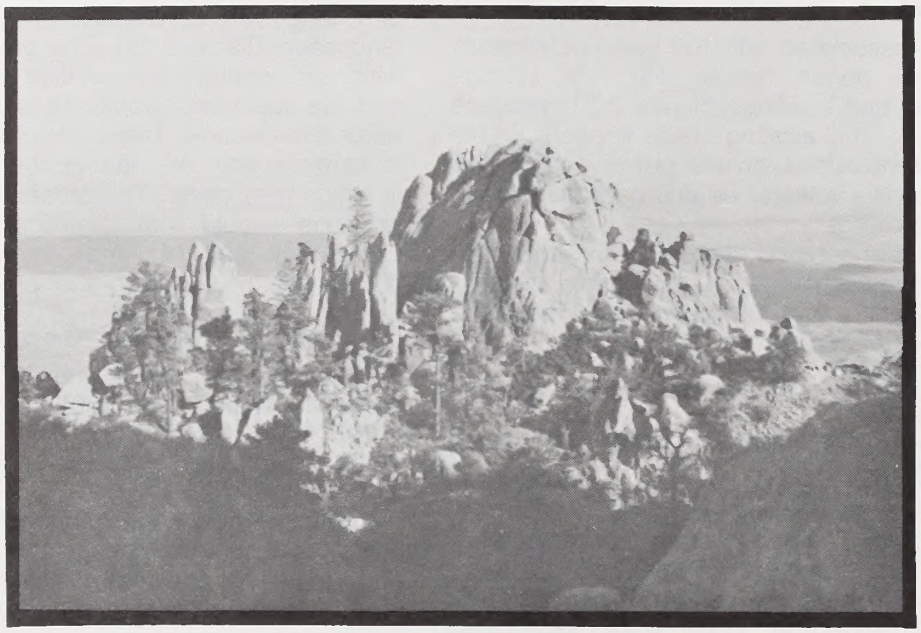


Figure 2-16. Ladron Mountain - 7,000 feet elevation
Example of VRM Class I

Figure 2-17. Tecolote Badlands
Example of VRM Class II

Figure 2-18. Coarse texture/broken line
Example of VRM Class III

Figure 2-19. Jornada del Muerto
Example of VRM Class IV

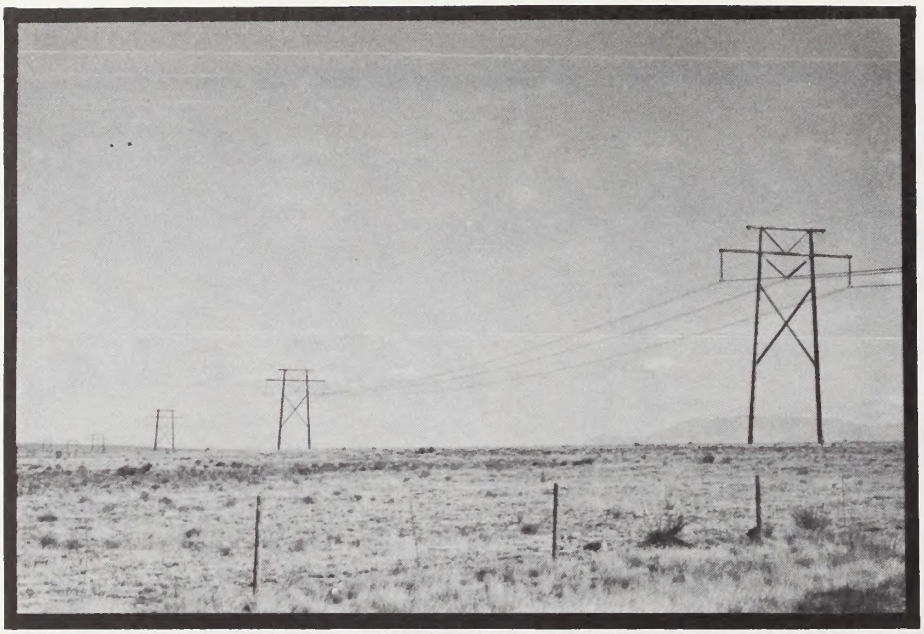


Figure 2-20. Intrusions - Powerlines
Example of VRM Class V

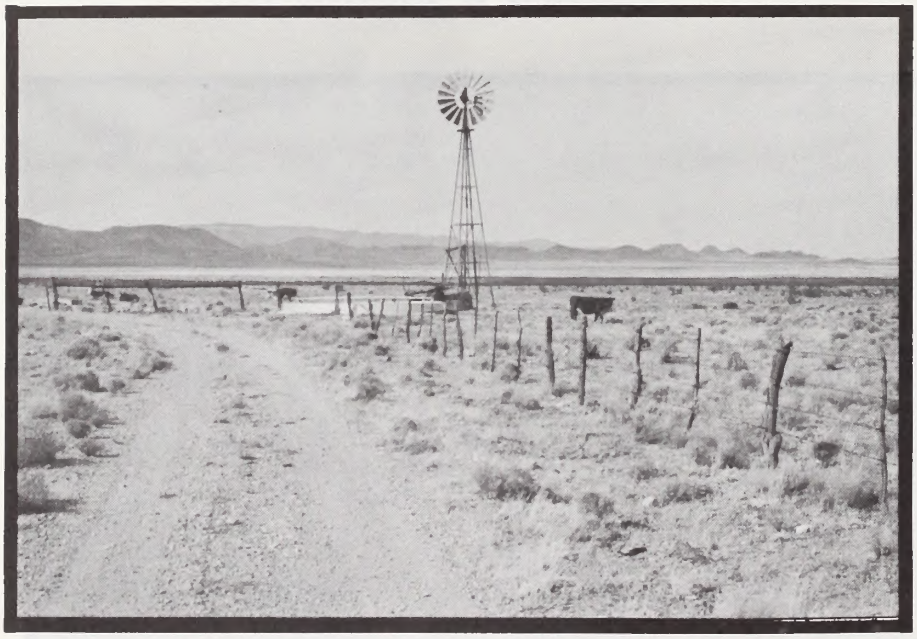


Figure 2-21. Intrusions associated with grazing

TABLE 2-38

EXISTING RANGE DEVELOPMENTS ASSOCIATED
WITH 100 YEARS OF LIVESTOCK GRAZING

| | Units | Total Units | Existing Number of Acres Disturbed: Long-Term |
|---|---|---|---|
| Fence | Miles | 1,524 | 305 |
| Cattleguards | Each | 28 | 2 |
| Wells | Each | 214 | 21 |
| Springs | Each | 59 | 3 |
| Pipelines | Miles | 276 | 28 |
| Storage Tanks | Each | 44 | 4 |
| Troughs | Each | 349 | 28 |
| Wildlife Waters | Each | 46 | 2 |
| Earthen Reservoirs | Each | 331 | 166 |
| Total Acres Disturbed | | | 559 |

Source: BLM Socorro District Grazing Files

TABLE 2-39

IMPACTS BY VISUAL RESOURCE CLASSES

| | Proposed Units | No. of Acres Affected (Short Term) /1 | Contrast Rating | Acceptable | No. of Acres Affected (Long Term) /1 | Contrast Rating | Acceptable |
|---|---|---|---|---|---|---|---|
| Class I Impacts | | | | | | | |
| Grazing Systems | All | 9,760.00 | 6 | Yes | 9,760.00 | 6 | Yes |
| Class II Impacts | | | | | | | |
| Grazing Systems | All | 6,364.00 | 6 | Yes | 6,364.00 | 6 | Yes |
| Class III Impacts | | | | | | | |
| Fences (Mi.) /2 | 35.7 | 35.70 | 23 | No | 7.14 | 12 | Yes |
| Cattleguards (No.) | 4.0 | 5.20 | 15 | Yes | 5.20 | 15 | Yes |
| Troughs (No.) /3 | 16.0 | 40.00 | 22 | No | 40.00 | 21 | No |
| Storage Tanks (No.) | 6.0 | 3.00 | 16 | Yes | 0.60 | 9 | Yes |
| Wells (No.) | 3.0 | 1.50 | 15 | Yes | 0.30 | 11 | Yes |
| Springs (No.) | 1.0 | 0.20 | 15 | Yes | 0.05 | 11 | Yes |
| Wildlife Waters (No.) | 7.0 | 0.80 | 15 | Yes | 0.35 | 11 | Yes |
| Pipelines (Mi.) /2 | 13.4 | 20.10 | 23 | No | 13.40 | 19 | No |
| Grazing Systems | All | 312,294.00 | 6 | Yes | 312,294.00 | 6 | Yes |
| Class IV Impacts | | | | | | | |
| Fences (Mi.) /2 | 178.5 | 178.50 | 24 | No | 35.70 | 12 | Yes |
| Cattleguards (No.) | 18.0 | 0.11 | 15 | Yes | 0.11 | 15 | Yes |
| Earthen Reservoirs (No.) | 1.0 | 1.00 | 22 | No | 0.50 | 22 | No |
| Troughs (No.) /3 | 63.0 | 157.50 | 22 | No | 157.50 | 21 | No |
| Storage Tanks | 35.0 | 17.50 | 16 | Yes | 3.50 | 11 | Yes |
| Wells (No.) | 13.0 | 6.50 | 15 | Yes | 1.30 | 11 | Yes |
| Springs (No.) | 3.0 | 0.60 | 13 | Yes | 0.15 | 16 | Yes |
| Wildlife Waters (No.) | 41.0 | 4.10 | 13 | Yes | 2.05 | 16 | Yes |
| Pipelines (Mi.) /2 | 75.3 | 112.95 | 24 | No | 75.30 | 19 | Yes |
| Grazing Systems | All | 935,418.00 | 6 | Yes | 935,418.00 | 6 | Yes |
| Class V Impacts | | | | | | | |
| Grazing Systems | All | 3,600.00 | 6 | Yes | 3,600.00 | 6 | Yes |

/1 Acres disturbed is for AMP allotments and includes all lands (public, State, and private).
/2 Acres disturbed relating to fences and pipelines include temporary and maintenance roads.
/3 Acres disturbed relating to troughs includes sacrifice areas (2.5 acres per trough).

Source: BLM Socorro District Files

developments on eight AMPs would be minor (Table 2-40).

**Livestock Adjustment Alternative** - Visual contrasts from construction of range developments would occur on 8 of the existing 25 AMPs. This would result in 90 acres of surface disturbance in the short term. The long-term disturbance would affect 67 acres. The visual contrasts from the presence of range developments on eight AMPs would be minor (Table 2-40).

**Pasture Capacity Level Alternative** - The construction of water developments would create a short-term, local disturbance of 365 acres in VRM Classes III and IV Areas. Vegetative and soil disturbance caused by 214 miles of temporary roads created during construction of fences would have a local impact on the visual environment. The visual acceptability of these roads is shown in Table 2-40. The construction of 89 miles of roads used for pipeline maintenance would create local visual contrasts which do not meet the VRM Class III and IV standards in the short term. These also would not meet the VRM Class III standards in the long term (Table 2-40).

Installation of 22 cattleguards on existing roads would have minor visual impacts. The earthen reservoir (on allotment 290) is the only water development in VRM Class IV that would not be acceptable in the long term. This totals 0.5 acres of long-term disturbance and is considered insignificant. A slight decrease in vegetative contrast between grazed and ungrazed pastures would occur. Sacrifice areas totaling 198 acres of disturbance around water troughs would not be acceptable to VRM Classes III and IV standards in the short and long terms.

**Enhancement of Sensitive Resource Values Alternative** - The visual impacts created under the Enhancement of Sensitive Resource Values Alternative would be slightly more than those under the Proposed Action. The construction of water developments would create a short-term, local disturbance of 365 acres in VRM Classes III and IV Areas. Vegetative and soil disturbance caused by 241 miles of temporary roads created during construction of fences would have a local impact on the visual environment. The visual acceptability of these roads is shown in Table 2-40. The construction of 89 miles of roads used for pipeline maintenance would create local visual contrasts which do not meet the VRM Classes III and IV standards in the short term. These also would not meet the VRM Class III standards in the long term (Table 2-40).

Installation of 22 cattleguards on existing roads would have minor visual impacts. The earthen reservoir (on allotment 290) is the only water development in VRM Class IV that would not be acceptable in the long term. This totals 0.5 acres and is considered insignificant. Sacrifice areas totaling 198 acres of disturbance around water troughs would not be acceptable to VRM Classes III and IV standards in the short term and would persist over the long term. A reduction of visual impacts would result from a decrease in vegetative and soil erosion contrasts over the long term. The reduction in visual impacts from this alternative would not be significant.

**No Grazing Alternative** - The 1,475 miles of required new fencing would follow legal boundaries and be installed by private landowners. There would be no BLM control over the visual impacts of range developments installed on private lands. Vegetative contrasts would be emphasized where ungrazed public lands are intermixed or adjacent to the private lands (Table 2-40).

## CUMULATIVE IMPACTS

**Proposed Action** - In the long term only the visual impacts from the earthen reservoir would not meet VRM Class IV standards. Pipeline maintenance roads would not meet the VRM Class III standards in which they occur over the long term.

**No Action Alternative** - In the long term only the visual impacts from pipeline maintenance roads would not meet the VRM Class III standards.

**Livestock Adjustment Alternative** - In the long term only the visual impacts from pipeline maintenance roads would not meet the VRM Class III standards.

**Pasture Capacity Level Alternative** - In the long term only the visual impacts from the earthen reservoir would not meet VRM Class IV standards. Pipeline maintenance roads would not meet the VRM Class III standards in which they occur.

**Enhancement of Sensitive Resource Values Alternative** - In the long term the visual impacts from the earthen reservoir would not meet the VRM Class IV standards. Pipeline maintenance roads would not meet the VRM Class III standards in which they occur.

**No Grazing Alternative** - The 1,475 miles of required new fencing would follow legal boundaries and be installed by private landowners. There would be no construction impacts on public lands. Vegetative contrasts would be emphasized where ungrazed public lands are intermixed or adjacent to the private lands.

The long-term soil and vegetative disturbances accompanying the construction of 1,475 miles of fence would not be acceptable to the VRM Classes III and IV in which they occur.

TABLE 2-40

SUMMARY OF VISUAL RESOURCE IMPACTS

| | Grazing Systems | | | | Range Developments | | | |
|---|---|---|---|---|---|---|---|---|
| | Average Contrast Rating | VRM Acceptability | | | Average Contrast Rating | VRM Acceptability | | |
| | | Class II | Class III | Class IV | | Class II | Class III | Class IV |
| Existing Environment | 10 | Yes | Yes | Yes | 16 | No | Yes | Yes |
| Proposed Action | 6 | Yes | Yes | Yes | 17 | None | No | Yes |
| No Action Alternative/ Future Environment | 10 | Yes | Yes | Yes | 16 | No | Yes | Yes |
| Livestock Adjustment Alternative | 6 | Yes | Yes | Yes | 16 | None | Yes | Yes |
| Pasture Capacity Level Alternative | 6 | Yes | Yes | Yes | 17 | None | No | Yes |
| Enhancement of Sensitive Resource Values Alternative | 5 | Yes | Yes | Yes | 16 | None | Yes | Yes |
| No Grazing Alternative | 23 | No | No | Yes | 23 | No | No | No |

Source: BLM Socorro District Files

### *Unavoidable Adverse Impacts*

The visual constrast of 339 acres due to soil and vegetative disturbances resulting from the construction and maintenance of range developments would persist over the long term. The presence of sacrifice areas around livestock waters would create long-term visual contrasts averaging 2.5 acres per trough. Eighty-nine (89) miles of maintenance roads would persist as long-term intrusions on the visual environment. Fences would not be totally screened by vegetation or land forms and would persist as artificial intrusions. Windmills and water troughs would still exist as artificial structures on the natural landscape. The presence of range developments would persist as visual contrasts. Visual contrasts would continue to exist in varying degrees between grazed and ungrazed pastures as a result of the grazing systems.

### *Irreversible and Irretrievable*

Any disturbance to surface soil or rock colors, erosion patterns, or geologic features which would leave a permanent scar on the landscape is considered to be irreversible.

## WILDERNESS

### *Existing Environment*

BLM was given wilderness designation and management responsibilities by Section 603 of the Federal Land Policy and Management Act (FLPMA). Guidance and procedures for BLM's relatively new wilderness program are currently being formulated. Pending the emergence of definitive manuals and regulations, BLM has issued interim guidance for the identification and management of potential wilderness areas. The initial step required of each BLM District is the identification of all wilderness inventory units. Once identified, these wilderness inventory units would be subject to a wilderness characteristic inventory. Those wilderness inventory units meeting certain minimum wilderness criteria would become Wilderness Study Areas. These Wilderness Study Areas would then be subject to additional criteria to determine suitability, in whole or in part, for wilderness designation. Wilderness inventory units that fail to meet minimum wilderness criteria would be eliminated from further consideration in the wilderness review process.

The District has tentatively identified 31 wilderness inventory units within the ES Area. These wilderness inventory units contain a total of approximately 400,000 acres, encompassing all or part of 58 allotments (Appendix 9, p. A-116). The wilderness inventory units have a broad variety of topography and vegetation. The varied environment of the wilderness inventory units includes lava flows (Malpais), short-grass rangelands, riparian bosque lands, lava-capped mesas, and rugged desert mountains.

Of special wilderness significance is Ladron Mountain. Approximately 18,000 acres of Ladron Mountain have been identified as a potential Wilderness Study Area. Prior to BLM's gaining wilderness designation authority under FLPMA, portions of Ladron Mountain had been studied for primitive area designation (Manthey, 1976).

### *Future Environment*

The wilderness identification and evaluation process would continue as required by Section 603 of FLPMA and existing BLM guidelines.

### *Impacts*

#### WILDERNESS VALUES

The present wilderness guidelines do not allow any proposed or existing actions on public lands that would impair their suitability for wilderness. Proposed grazing systems do not significantly affect existing wilderness values. Range developments associated with implementation of grazing systems would be delayed, modified, or eliminated pending clearance through the application of wilderness criteria.

The 31 tentatively identified wilderness inventory units would be inventoried and evaluated for wilderness characteristics prior to implementation of any new BLM action affecting these units. Some of these wilderness inventory units would be eliminated from further wilderness consideration following evaluation. Those units that are identified as having wilderness characteristics would become wilderness study areas. These study areas would be subject to evaluation by BLM's wilderness guidelines as applied through the planning system.

All existing multiple uses and supporting activities would be allowed to continue in the 31 identified wilderness inventory units 'to the degree and manner in which the same was being conducted on the date of approval of this Act' (FLPMA, 1976, Sec. 603c). New uses or expanded existing uses would be allowed if the impacts would not impair the suitability of the unit for wilderness consideration. The improved vegetative response in the long term would enhance the wilderness characteristics of the affected wilderness inventory units.

**Proposed Action** - All proposed range developments and grazing systems would be subject to the wilderness guideline constraints. No significant impacts are anticipated. Implementation of the new AMPs or modification of the 25 existing AMPs may be delayed or modified on 58 allot-

ments occurring in the 31 wilderness inventory units.

**No Action Alternative** - All proposed range developments and grazing systems would be subject to the wilderness guideline constraints. No significant impacts are anticipated. Any proposed projects or changes in grazing systems on the 25 existing AMPs may be delayed or modified on 21 allotments occurring in the 31 wilderness inventory units.

**Livestock Adjustment Alternative** - All proposed range developments and grazing systems would be subject to the wilderness guideline constraints. No significant impacts are anticipated. Any proposed projects or changes in grazing systems on the 25 existing AMPs may be delayed or modified on 21 allotments occurring in the 31 wilderness inventory units.

**Pasture Capacity Level Alternative** - All proposed range developments and grazing systems would be subject to the wilderness guideline constraints. No significant impacts are anticipated. Implementation of the new AMPs or modification of the 25 existing AMPS may be delayed or modified on 58 allotments occurring in the 31 wilderness inventory units. The improved vegetative response in the long term would enhance the wilderness characteristics of the affected wilderness inventory units.

**Enhancement of Sensitive Resource Values Alternative** - All proposed range developments and grazing systems would be subject to the wilderness guideline constraints. No significant impacts are anticipated. Implementation of the new AMPs or modification of the 25 existing AMPs may be delayed or modified on 58 allotments occurring in the 31 wilderness inventory units. The reduction of 949 AUMs on portions of allotments 006, 039, 052, 059, 077, and 086 within the Ladron Mountain wilderness inventory unit would not significantly enhance the wilderness values in the short term but would slightly improve the wilderness values in the long term.

VRM Class II Areas would benefit from a reduction of 2,236 AUMs and from no construction of range developments. This would enhance any potential wilderness values in these Class II Areas. This would be a long-term, local impact.

**No Grazing Alternative** - The fencing of private land would adversely affect the visual resources and wilderness values of adjacent public lands on a local basis. Generally, the wilderness character of the 31 wilderness inventory units would benefit over the long term from the elimination of grazing and possible removal of existing range developments.

## CUMULATIVE IMPACTS

**Proposed Action** - No significant impacts should occur.

**No Action Alternative** - No significant impacts should occur.

**Livestock Adjustment Alternative** - No significant impacts should occur.

**Pasture Capacity Level Alternative** - No significant impacts should occur.

**Enhancement of Sensitive Resource Values Alternative** - A slight improvement in wilderness values would result from removing 949 AUMs from the Ladron Mountain wilderness inventory unit.

**No Grazing Alternative** - There would be a slight improvement in wilderness values.

3

# CHAPTER 3

## THE RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

## SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

This chapter summarizes the trade offs between short-term uses of man's environment with and without the Proposed Action or alternatives. It also predicts the Environmental Statement (ES) Area's long-term productivity. 'Short-term use' is the total production that would occur in 20 years. This is the time it would take to reach the objectives of the Proposed Action or alternatives. The 'long-term productivity' refers to the possible enhancement, maintenance, or decline of the long-term productivity of ecological and economic resources that would continue after the 20 years because of the Proposed Action or alternatives. Short-term uses are measured in animal units (AUs), acre-feet of soil, vegetative animal unit months (AUMs), dollars, etc. The relationship between the short-term uses is determined by calculating the total production under the Proposed Action or alternatives for the 20-year short-term use and comparing it to the estimated total production of the area for the same time period as projected under Future Environment (which is the same as the No Action Alternative). The calculations use the Existing Environment or short-term annual rates (during the first five years), and the long-term (20th year) annual production rate, both shown in Chapter 2, Resource Analysis. The methodology for calculating 20-year total production is in Appendix 10, p. A-117. Long-term productivity is measured in percent change of annual production in the 20th year. Table 3-1 shows the short-term use values (total production) and the changes in long-term productivity.

The increases in total vegetative production (Table 3-1) are paralleled by improvement in range condition (Table 2-6) and increases in density and cover (Table 2-2). The decreases in total income (Table 3-1) result in a decline in the quality of the ranching lifestyle and operator attitudes.

The trade offs during the 20-year short-term use period under the Proposed Action and each alternative are shown in Table 3-2. In order to make positive changes in resource components such as increased vegetation production and decreased sediment yield, negative changes such as decreased animal numbers and decreased direct income would occur. The reduction in livestock numbers and direct income would be reversed in the years after the short-term use period (20 years) under the Proposed Action, Pasture Capacity Level and Enhancement of Sensitive Resource Values Alternatives because of the increase in long-term productivity (Table 3-1). These changes would continue becoming more negative after the 20-year short-term period under the Livestock Adjustment and No Grazing Alternatives because the long-term productivity would be less than under the No Action Alternative (Table 3-1).

In summary for the 20-year, short-term use period there would be trade offs between improving the quality and/or quantity of natural resources (e.g., vegetation, wildlife, wild horses, erosion condition, etc.) and decreasing the total number of livestock (Table 3-1) and total income (Table 3-1) and causing a decline in the quality of the ranching lifestyle for the operators in the ES Area.

After implementation of the Proposed Action a total of ten jobs would be lost. By the end of the short-term use period (20 years) all jobs lost could be regained and one new job would be created. Six subsistence small operators would be reduced to 0 AUMs after implementation of the Proposed Action. By the end of the short-term use period (20 years) two of these operators may reenter the livestock industry when vegetative conditions improve. The other four operators would have their grazing use permanently eliminated.

After implementation of the No Action Alternative a total of two jobs would be lost. By the end of the short-term use period (20 years) all jobs lost could be regained. The number of operators would not change from the existing situation.

After implementation of the Livestock Adjustment Alternative a total of ten jobs would be lost. By the end of the short-term use period (20 years) all but one job lost could be regained. Six subsistence small operators would be reduced to 0 AUMs after implementation of the Livestock Adjustment Alternative. By the end of the short-term

TABLE 3-1

TOTAL PRODUCTION FOR 20 YEARS AND CHANGES IN LONG-TERM PRODUCTIVITY

| Resource Component | Annual Production Rate Years 1-5 | Annual Production Rate Year 20 | Total Production 20 Years | Net Change From Future Environment | % Change Total Production | Long-Term Productivity /1 |
|---|---|---|---|---|---|---|
| Vegetation Production (AUMs) | | | | | | |
| NA/FE | 134,942 | 146,988 | 2,831,346 | -- | -- | -- |
| PA | 134,942 | 184,488 | 3,243,846 | +412,500 | +15 | +26 |
| LA | 134,942 | 174,811 | 3,137,399 | +306,053 | +11 | +19 |
| PCL | 134,942 | 216,592 | 3,596,990 | +765,644 | +27 | +47 |
| ESR | 134,942 | 221,920 | 3,655,598 | +824,252 | +29 | +51 |
| NG | 134,942 | 359,924 | 5,173,642 | +2,342,296 | +83 | +145 |
| Average Sediment Yield (ac-ft/yr) | | | | | | |
| NA/FE | 1,483 | 1,380 | 28,527 | -- | -- | -- |
| PA | 1,483 | 1,115 | 25,612 | -2,915 | -10 | -19 |
| LA | 1,483 | 1,195 | 26,492 | -2,035 | -7 | -13 |
| PCL | 1,483 | 1,030 | 24,677 | -3,850 | -13 | -25 |
| ESR | 1,483 | 1,030 | 24,677 | -3,850 | -13 | -25 |
| NG | 1,483 | 478 | 18,605 | -9,922 | -35 | -65 |
| Groundwater Withdrawal (ac-ft/yr) | | | | | | |
| NA/FE | 258 | 270 | 5,292 | -- | -- | -- |
| PA | 214 | 277 | 4,973 | -319 | -6 | +3 |
| LA | 214 | 268 | 4,874 | -418 | -8 | -1 |
| PCL | 189 | 318 | 5,199 | -255 | -5 | +18 |
| ESR | 171 | 318 | 5,037 | -93 | -2 | +18 |
| NG | 145 | 145 | 2,900 | -2,392 | -45 | -46 |
| Livestock (AUs) | | | | | | |
| NA/FE | 19,108 | 20,200 | 394,172 | -- | -- | -- |
| PA | 15,804 | 20,529 | 368,055 | -26,117 | -7 | +2 |
| LA | 15,823 | 19,724 | 359,200 | -34,972 | -9 | -2 |
| PCL | 13,931 | 23,183 | 380,392 | -13,780 | -3 | +15 |
| ESR | 12,674 | 23,598 | 373,633 | -20,539 | -5 | +17 |
| NG | 11,006 | 11,006 | 220,120 | -174,052 | -44 | -46 |
| Direct Income ($) | | | | | | |
| NA/FE | 2,399,368 | 2,532,589 | 45,897,040 | -- | -- | -- |
| PA | 1,979,537 | 2,552,837 | 45,897,040 | -3,555,751 | -7 | +1 |
| LA | 1,979,537 | 2,467,854 | 44,962,227 | -4,490,564 | -9 | -3 |
| PCL | 1,689,481 | 2,613,109 | 43,949,528 | -5,503,263 | -11 | +3 |
| ESR | 1,549,126 | 2,758,084 | 44,281,058 | -5,171,733 | -10 | +9 |
| NG | 1,332,536 | 1,332,536 | 26,650,720 | -22,802,071 | -46 | -47 |
| Wildlife (AUMs) | | | | | | |
| NA/FE | 2,362 | 2,394 | 47,592 | -- | -- | -- |
| PA | 4,802 | 5,041 | 98,669 | +51,077 | +107 | +111 |
| LA | 4,802 | 4,893 | 97,041 | +49,449 | +104 | +104 |
| PCL | 4,802 | 5,057 | 98,845 | +51,253 | +108 | +111 |
| ESR | 5,018 | 5,287 | 103,319 | +55,727 | +117 | +121 |
| NG | 79,255 | 138,914 | 2,241,349 | +2,193,757 | +4,610 | +5,703 |
| Wild Horses (AUMs) | | | | | | |
| NA/FE | 384 | 549 | 495 | -- | -- | -- |
| PA | 384 | 549 | 495 | -- | -- | -- |
| LA | 384 | 549 | 495 | -- | -- | -- |
| PCL | 384 | 549 | 495 | -- | -- | -- |
| ESR | 1,583 | 3,111 | 48,468 | +38,885 | +410 | +467 |
| NG | 1,695 | 3,535 | 54,140 | +44,645 | +470 | +544 |
| Recreation (Visitor Days) | | | | | | |
| NA/FE | 34,946 | 49,903 | 863,447 | -- | -- | -- |
| PA | 34,946 | 49,903 | 863,447 | -- | -- | -- |
| LA | 34,946 | 49,903 | 863,447 | -- | -- | -- |
| PCL | 34,946 | 49,903 | 863,447 | -- | -- | -- |
| ESR | 34,946 | 49,903 | 863,447 | -- | -- | -- |
| NG | 34,946 | 49,903 | 863,447 | -- | -- | -- |

/1 The long-term productivity is the percent change between the annual production rate for the Future Environment and the annual production rate in the 20th year of the Proposed Action and Alternatives.

EE - Existing Environment
PA - Proposed Action
PCL - Pasture Capacity Level Alternative
NG - No Grazing Alternative

NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
ESR - Enhancement of Sensitive Resource Values Alternative

Source: Table 2-1

Table 3-2

TRADE-OFFS UNDER THE PROPOSED ACTION AND ALTERNATIVES FOR THE 20-YEAR, SHORT-TERM USE PERIOD /1

| | Units | No Action Alternative Production | Change in 20 Year Production and Percent Change | | | | |
|---|---|---|---|---|---|---|---|
| | | | Proposed Action | Livestock Adjustment | Pasture Capacity Level | Enhancement of Sensitive Resource Values | No Grazing |
| Desirable Changes | | | | | | | |
| Increased Total Vegetative Production | AUMs | 2,831,346 | +412,500 (+15) | +306,053 (+11) | +765,644 (+27) | 769,868 (+27) | 2,417,855 (+85) |
| Decreased Total Sediment Yield | ac-ft/yr | 28,527 | -2,915 (-10) | -2,035 (-7) | -3,850 (-13) | -3,850 (-13) | -9,922 (-35) |
| Decreased Total Groundwater Withdrawals | ac-ft/yr | 5,292 | -319 (-6) | -418 (-8) | -255 (-5) | -93 (-2) | -2,392 (-45) |
| Increased Total Wildlife Forage Available | AUMs | 47,511 | +51,158 (+108) | +49,530 (+104) | +51,334 (+108) | +53,432 (+112) | +2,193,676 (+4,617) |
| Increased Total Wild Horse Forage Available | AUMs | 9,583 | 0 (0) | 0 (0) | 0 (0) | +38,885 (+406) | +41,029 (+428) |
| Undesirable Changes | | | | | | | |
| Decreased Total /2 Livestock Numbers | AUMs | 393,686 | -25,460 (-6) | -34,315 (-9) | -13,303 (-3) | -20,053 (-5) | -172,146 (-44) |
| Decreased Total /2 Direct Income | Dollars | 49,454,780 | -3,557,740 (-7) | -4,492,553 (-9) | -5,505,252 (-11) | -5,173,722 (-10) | -22,804,060 (-46) |

/1 Trade-offs are based on the difference between No Action Alternative and the Proposed Action and other alternatives. The differences are between the total production for 20 years needed to meet the objectives of the various alternatives.

/2 Includes non-public land AUs and direct income derived therefrom.

Source: Table 3-1

use period (20 years) two of these operators may reenter the livestock industry when vegetative conditions improve. The other four operators would have their grazing use permanently eliminated.

After implementation of the Pasture Capacity Level Alternative a total of fifteen jobs would be lost. By the end of the short-term use period (20 years) all jobs lost could be regained and seven new jobs would be created. Six subsistence small operators would be reduced to 0 AUMs after implementation of the Pasture Capacity Level Alternative. By the end of the short-term use period (20 years) two of these operators may reenter the livestock industry when vegetative conditions improve. The other four operators would have their grazing use permanently eliminated.

After implementation of the Enhancement of Sensitive Resource Values Alternative a total of eighteen jobs would be lost. By the end of the short-term use period (20 years) all jobs lost could be regained and nine new jobs would be created. Eleven operators would be reduced to 0 AUMs after implementation of the Enhancement of Sensitive Resource Values Alternative. By the end of the short-term use period (20 years) seven of these operators may reenter the livestock industry when vegetative conditions improve. The other four operators would have their grazing use permanently eliminated.

After implementation of the No Grazing Alternative a total of 22 jobs would be lost and not reinstated in the long term. Fifteen operators would be permanently eliminated.

# CHAPTER 4

## CONSULTATION AND COORDINATION

## TEAM ORGANIZATION

This Environmental Statement (ES) was prepared by a team of Bureau of Land Management (BLM) professionals from the BLM Socorro District Office. This team had members with expertise in a broad spectrum of resources: geology, vegetation, soils, water resources, wildlife, livestock, socio-economics, wild horses, cultural resources, recreation, visual resources, wilderness, and writing-editing.

The East Socorro Grazing ES Team was organized in Socorro on April 18, 1977. All team members were District personnel who were already familiar with the Area. All team members received three days of training in Environmental Statement preparation in Albuquerque, New Mexico during January 1977. This was provided by the BLM staff from the Washington and New Mexico State Offices. In addition, the Washington and New Mexico State Office BLM staffs were taken on a tour to familiarize them with the ES Area.

## CONSULTATION AND COORDINATION FOR DRAFT ES

During preparation of the Draft, State and other Federal agencies, as well as private individuals and universities with expertise relating to the Proposed Action, were contacted for information. Records of personal contacts and telephone contacts are on file in the BLM Socorro District Office. Prior to preparing the Draft ES, BLM issued contracts for information regarding cultural resources, threatened and endangered plants, water quality, socio-economics, and livestock grazing.

Public involvement in the preparation of this ES was initiated shortly after the District was notified to prepare an ES. In July of 1975, the Socorro District mailed a notice containing two news articles explaining the Court Order and Court Agreement that directed BLM to prepare ESs. This was followed in August 1975 by an information letter announcing a public meeting which was held in Socorro on September 10, 1975. A public meeting was also held in Quemado, New Mexico on October 23, 1975.

During the range survey, soil survey, and Allotment Management Plan (AMP) preparation, numerous contacts were made with the livestock permittees.

The Socorro District Multiple Use Advisory Board toured the ES Area in November 1976 to obtain a better understanding of the range survey and AMP development procedures.

Letters were sent to various individuals and organizations on June 27, 1977, describing the ES preparation process and requesting input. They included:

Federal Agencies - 25
State Agencies - 12
Local Governmental Agencies - 8
Environmental Interest Groups - 33
Energy Groups - 21
Allottees - 103
Livestock Organizations - 4

Seventeen newspapers, 21 radio and 3 TV stations that serve the ES Area received a news release in July 1977. Allottees and interest groups received a fact sheet in August 1977 describing progress. Allottees also received copies of the Advisor, a BLM New Mexico State Office publication, which featured an article about the Socorro ES in the August 1977 edition. The Socorro District Office made an effort to inform the public through information presented in a booth at the Socorro County Fair, held September 2-4, 1977.

These efforts to involve the public resulted in the following comments:

## FEDERAL AGENCIES

Agricultural Research Services, Beltsville, MD.

Comment via letter: Furnished advice on determining sediment yield.

Dale B. Raith

Bureau of Reclamation, Southwest Region, Amarillo, TX.

Comment via letter: Stated that the ES Area is just north of the Bureau of Reclamation Elephant Butte Reservoir and may affect that area. Mr. James Kirby, Project Superintendent for the Rio Grande Project, should be contacted for additional input.

James W. Kirby

Bureau of Reclamation, Rio Grande Project, El Paso, TX.

Comment via letter: Noted that construction of range improvements and vegetative manipulation will impact Elephant Butte Reservoir. Representatives of the two agencies should meet to discuss the dual management of the Elephant Butte Area.

Felix J. Sedillo
Department of the Army, White Sands Missile Range, NM.

Comment via letter: Stated portions of the ES Area are contiguous to areas used by the Missile Range. The northern and northwestern boundaries of WSMR have minimum fencing and there are no plans to construct additional fencing.

Fish and Wildlife Service, Albuquerque, NM.

Comment via letter: Stated there would be no impact to endangered species in the ES Area.

Keith T. Pfefferle
U. S. Forest Service, Supervisor's Office, Cibola National Forest, Albuquerque, NM.

Comment via letter: Said the Forest Service is very interested in the BLM grazing program since the ES Area borders the Cibola National Forest.

Bernard H. Brunner
U. S. Forest Service, Cibola National Forest, Magdalena Ranger District

Comment via letter: Mentioned two allottees graze both Forest Service and BLM lands. The Forest Service wishes to be kept informed of any management practice which would alter the grazing pattern on adjacent National Forest lands. How would BLM fences affect access to the National Forest?

National Climatic Center, Asheville, NC.

Comment via letter: Provided rainfall data.

Edwin A. Swenson
Soil Conservation Service, Albuquerque, NM.

Comment via letter: Said SCS has been studying the Sevilleta National Wildlife Refuge from which livestock have been excluded. The findings may be of value in writing the ES.

Joe G. Batson
Soil Conservation Service, Las Cruces Area Office, Las Cruces, NM.

Comment via letter: Stated the SCS has responsibilities which affect the grazing program. On ranches which contain intermingled public and private lands, the SCS can assist ranchers to develop range management systems.

## NEW MEXICO STATE AGENCIES

Frank E. Kottlowski
New Mexico Bureau of Mines and Mineral Resources, Socorro, NM.

Comment via letter: Dr. John Hawley would be pleased to review the completed ES and give geologic input.

New Mexico Department of Game and Fish, Albuquerque, Las Cruces, and Santa Fe, NM.

Comments via letter, phone, and personal contact: Provided data on wildlife populations and information about threatened and endangered species. Made recommendations concerning wildife habitat.

Laboratory of Anthropology

Comment via personal contact: Provided information on the archaeology of the ES Area.

Robert S. Nanninga
Middle Rio Grande Conservancy District, Albuquerque, NM.

Comment via letter: The grazing program will not affect the Conservancy District since nearly all lands are privately owned.

Tommy J. Fajardo
New Mexico State Highway Department, District No. 1, Deming, NM.

Comment via letter: Stated no new roads are contemplated within the ES Area except for the upgrading of 7 miles of State Road 107. Fencing both sides of the highway might be required.

Thomas W. Merlan
State Historic Preservation Officer, Santa Fe, NM.

Comments via phone, letter, and personal contact: Consulted several times to determine which sites were eligible for nomination to National Register of Historic Places.

## EDUCATIONAL INSTITUTIONS

Dr. Reldon F. Beck
Department of Animal and Range Science, New Mexico State University, Las Cruces, NM.

Comment via letter: Reviewed procedures for measuring potential productivity and range condition.

Dr. Gary Donart
Department of Animal and Range Science, New Mexico State University, Las Cruces, NM.

Comment via phone: Provided information about grazing systems.

Karl Laumback
Department of Sociology and Arthropology, New Mexico State University, Las Cruces, NM.

Comment via phone: Discussed impacts on cultural resources due to cattle grazing.

Dr. Bobby Rankin
Department of Animal Science, New Mexico State University, Las Cruces, NM.

Comment via phone: Provided information about wild horses.

Dr. Jerry Schickedanz
Range Management Specialist, New Mexico State University, Las Cruces, NM.

Comments via phone and personal contact: Discussed range survey methods and the effects of grazing on creosote.

Dr. Marshall Haferkamp
Range Science Department, Texas A&M University, College Station, TX.

Comment via phone: Provided literature concerning rotational grazing systems.

## PRIVATE GROUPS OR INDIVIDUALS

Mr. Riss Bishop
Rancher, Mountainair, NM.

Comment via letter: Ranchers have adopted advanced range management practices to enhance ranch operations.

Grazing has no effect on air quality although overgrazing can cause soil erosion. This is minimized and vegetation improved by moderate grazing. Water developments benefit livestock and wildlife alike. Ranchers want to make their own decisions without outside intervention because it affects their livelihood.

Mrs. Helen A. Reilly
International Society for the Protection of Mustangs and Burros, Reno, NV.

Comment via letter: The Society urged an increased supervision of range use, a readjustment of grazing privileges to proper grazing capacity, enforcement of seasonal livestock use, and a full consideration of environmental impacts of competing land use.

Mr. J. P. Oney
Rancher, Mountainair, NM.

Comment via letter: Ranchers are concerned about the environment since they make a living from the land. Environmental impacts of grazing are minimal on a well managed ranch. Air and water quality are not affected. Soil erosion is possible on trails and roads but can be stopped through maintenance. It is best to graze moderately and distribute cattle evenly over the range.

I do not believe in government intervention and regulation. It can only complicate an already tough competitive business. No outside advice can be taken as law, because outsiders do not have the close contact with the land to make the critical decisions necessary to protect the land or my economic situation.

Rod Hille
Sierra County Farm Bureau, Truth or Consequences, NM.

Comment via letter: Compulsory grazing systems which include private and State land violate civil rights. The rancher can make more competent decisions than the BLM manager since the rancher lives with his operation. BLM does not take the economic impact on each rancher into consideration. Grazing systems should be flexible rather than tied to a fixed timetable. BLM should seek the cooperation of the permittees.

Harvey M. Williams
Southwestern New Mexico Audubon Society, Silver City, NM.

Comment via letter: At present too many cattle are allowed to graze, adversely affecting soil and vegetation, including riparian zones. Fewer grazing animals would extend the grazing life of the range rather than deplete it.

Jeff Edwards
Wild Horse Research Farm, Porterville, CA.

Comment via letter: Does not feel he has any input that would be of value to the ES.

## COORDINATION IN REVIEW OF DRAFT ES

Comments on the Draft ES will be requested from the following agencies and interest groups:

### FEDERAL AGENCIES

#### U. S. Department of Agriculture

Agricultural Stabilization and Conservation Service
Forest Service
Soil Conservation Service

#### Environmental Protection Agency

#### U. S. Department of the Interior

Advisory Council on Historic Preservation
Bureau of Mines
Bureau of Reclamation
Fish and Wildlife Service
Heritage Conservation and Recreation Service
National Park Service
U. S. Geological Survey

#### U. S. Department of the Army

Corps of Engineers
White Sands Missile Range

### NEW MEXICO STATE AGENCIES

Department of Game and Fish
Department of Natural Resources
Division of State Forestry
Environmental Improvement Division
Middle Rio Grande Conservancy District
Middle Rio Grande Council of Governments
New Mexico State Clearinghouse
New Mexico Office of the Governor
Southern Rio Grande Council of Governments
State Engineer's Office
State Highway Department
State Historic Preservation Office
State Land Office
State Planning Office

### LOCAL GOVERNMENTS

City of Socorro
Laguna Planning Commission
Pueblo de Acoma
Sierra County Commissioners
Socorro County Commissioners
The Navajo Nation
Torrance County Commissioners
Valencia County Commissioners
Village of Magdalena

### ENVIRONMENTAL INTEREST GROUPS

Ada County Fish and Game League
American Horse Protection Association
Audubon Society
Center for Environmental Research Central Clearinghouse
Central Rio Grande Soil and Water Conservation District
Friends of the Earth
International Society for the Protection of Mustangs and Burros
Jornada Resource Conservation and Development
National Council of Public Land Users
National Mustang Association
National Wildlife Federation
Natural Resources Defense Council
Nevada Outdoor Recreation Association
New Mexico Association of National Resource Conservation Districts
New Mexico Conservation Coordinating Council
New Mexico Ornithological Society
New Mexico Wilderness Study Committee
Oregon Environmental Council
Salado Soil and Water Conservation District
Sierra Club
Socorro Soil and Water Conservation District

Southwest New Mexico Resource Conservation and Development
Spanish Barb Wild Horse Research Farm
Spanish Mustang Registry
Wild Horse Organized Assistance
Wilderness Society

## LIVESTOCK INTEREST GROUPS

New Mexico Farm and Livestock Bureau
New Mexico Cattle Growers
Public Lands Council
Sierra County Farm Bureau
West Central Grazing Permittees Association

## PROFESSIONAL SOCIETIES

Society for Range Management
Soil Conservation Society of America
The Wildlife Society

## OTHER GROUPS

Arizona State University
Eastern New Mexico University
Museum of New Mexico
Navajo Tribal Museum
New Mexico State University
School of American Research
University of New Mexico

## INDIVIDUALS

James Morgan
Jerry Schickedanz
Livestock Permittees

Public hearings will be held in Albuquerque and Socorro, New Mexico. Time and place information will be published in the Federal Register and local newspapers.

# APPENDICES

A

# APPENDIX I

PROPOSED ACTION AND ALTERNATIVES


| | | Page |
|---|---|---|
| Table A-1 | Proposed Action | A-1 |
| Range Survey Methods | | A-8 |
| Range Survey Methodology | | A-8 |
| Determination of Rangeland Suitability for Livestock Grazing | | A-9 |
| Figure A-1 | Record of Pace Transect | A-10 |
| Figure A-2 | Form 7310-12 Determination of Erosion Condition Class | A-11 |
| Figure A-3 | Form 4412-1 Forage Survey Type Writeup | A-12 |
| Figure A-4 | Summary of Range Survey by Allotment | A-13 |
| Figure A-5 | Range Suitability Standards | A-14 |
| Methodology for Determining Existing Deer Numbers and Existing and Predicted Antelope Numbers | | A-15 |
| Figure A-6 | Examples of the Proposed Six Typical Grazing Systems | A-17 |
| Table A-2 | Proposed Range Development and AMP Implementation Schedule | A-18 |
| Table A-3 | Planning System Interrelationships | A-24 |

TABLE A-1

PROPOSED ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSED GRAZING USE /5 Public Land AUMs% 1/ | PROPOSED GRAZING USE /5 Livestock AUMs | PROPOSED GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| AMPs | | | | | | | | |
| 002 P Mesa Carrizo | | | | | | | | |
| 14,572 Ac. PL | 33 | 1,776 | 36 | 29 | 753 | | | |
| 33,951 Ac. 0 | | 3,576 | 0 | | 1,879 | | | |
| 48,523 Ac. | | 5,352 | 36 | | 2,632 | 79 | -51 | RR-3 |
| 006 P Ojo Saladito | | | | | | | | |
| 11,250 Ac. PL | 87 | 1,441 | 36 | 84 | 1,235 | | | |
| 2,481 Ac. 0 | | 207 | 0 | | 243 | | | |
| 13,731 Ac. | | 1,648 | 36 | | 1,478 | 34 | -10 | RR-4 |
| 012 P Riley Community | | | | | | | | |
| 1,794 Ac. PL | 100 | 96 | 0 | 100 | 65 | | | |
| 935 Ac. 0 | | 0 | 0 | | 0 | | | |
| 2,729 Ac. | | 96 | 0 | | 65 | 5 | -22 | RD-2 |
| 016 P Puertecito & Barranco | | | | | | | | |
| 12,512 Ac. PL | 53 | 1,260 | 0 | 47 | 1,060 | | | |
| 13,325 Ac. 0 | | 1,098 | 0 | | 1,194 | | | |
| 25,837 Ac. | | 2,358 | 0 | | 2,254 | 48 | - 4 | RB-4 |
| 036 E Rio Puerco /7 | | | | | | | | |
| 11,959 Ac. PL | 98 | 1,177 | 0 | 98 | 1,177 | | | |
| 137 Ac. 0 | | 23 | 0 | | 23 | | | |
| 12,096 Ac. | | 1,200 | 0 | | 1,200 | 7 | 0 | RR-3 |
| 037 P Chavez Community | | | | | | | | |
| 11,873 Ac. PL | 85 | 1,950 | 24 | 84 | 1,132 | | | |
| 2,203 Ac. 0 | | 342 | 0 | | 220 | | | |
| 14,076 Ac. | | 2,292 | 24 | | 1,352 | 62 | -41 | RR-3 |
| 052 P Cerro Colorado | | | | | | | | |
| 1,376 Ac. PL | 67 | 144 | 12 | 55 | 43 | | | |
| 720 Ac. 0 | | 72 | 12 | | 35 | | | |
| 2,096 Ac. | | 216 | 24 | | 78 | 19 | -64 | CS-1 |
| 058 E Canon Alamito | | | | | | | | |
| 3,619 Ac. PL | 83 | 624 | 12 | 77 | 413 | | | |
| 958 Ac. 0 | | 132 | 0 | | 121 | | | |
| 4,577 Ac. | | 756 | 12 | | 534 | 14 | -29 | RD-2 |
| 059 E La Jencia | | | | | | | | |
| 18,028 Ac. PL | 62 | 1,992 | 144 | 60 | 1,064 | | | |
| 9,662 Ac. 0 | | 1,236 | 0 | | 698 | | | |
| 27,690 Ac. | | 3,228 | 144 | | 1,762 | 110 | -45 | RR-6 |
| 065 E Arroyo Lucero | | | | | | | | |
| 11,919 Ac. PL | 38 | 1,380 | 24 | 35 | 995 | | | |
| 21,173 Ac. 0 | | 2,256 | 0 | | 1,836 | | | |
| 33,092 Ac. | | 3,636 | 24 | | 2,831 | 65 | -22 | RS-4 |
| 077 E Ladron Peak | | | | | | | | |
| 4,276 Ac. PL | 76 | 420 | 0 | 57 | 108 | | | |
| 2,297 Ac. 0 | | 132 | 0 | | 83 | | | |
| 6,573 Ac. | | 552 | 0 | | 191 | 46 | -65 | RR-2 |
| 081 E Lopez Community /7 | | | | | | | | |
| 5,869 Ac. PL | 95 | 900 | 67 | 95 | 900 | | | |
| 320 Ac. 0 | | 48 | 0 | | 48 | | | |
| 6,189 Ac. | | 948 | 67 | | 948 | 14 | 0 | RR-3 |
| 083 P Big Sandy Wash | | | | | | | | |
| 634 Ac. PL | 100 | 72 | 0 | 100 | 64 | | | |
| 0 Ac. 0 | | 0 | 0 | | 0 | | | |
| 634 Ac. | | 72 | 0 | | 64 | 2 | -11 | CS-1 |
| 086 P West Ladron /7 | | | | | | | | |
| 23,918 Ac. PL | 83 | 2,340 | 132 | 83 | 2,340 | | | |
| 3,964 Ac. 0 | | 492 | 0 | | 492 | | | |
| 27,882 Ac. | | 2,832 | 132 | | 2,832 | 84 | 0 | RR-4 |
| 089 P Tsidu-Weza | | | | | | | | |
| 321 Ac. PL | 50 | 48 | 0 | 49 | 21 | | | |
| 323 Ac. 0 | | 48 | 0 | | 22 | | | |
| 644 Ac. | | 96 | 0 | | 43 | 2 | -55 | CS-1 |
| 090 P Petoch Wash | | | | | | | | |
| 9,189 Ac. PL | 68 | 1,428 | 24 | 68 | 656 | | | |
| 4,710 Ac. 0 | | 672 | 0 | | 303 | | | |
| 13,899 Ac. | | 2,100 | 24 | | 959 | 26 | -54 | RR-3 |

TABLE A-1 (continued)

PROPOSED ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSED GRAZING USE /5 Public Land AUMs% 1/ | PROPOSED GRAZING USE /5 Livestock AUMs | PROPOSED GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| AMPs (cont.) | | | | | | | | |
| 091 E Canada Colorado | | | | | | | | |
| 7,394 Ac. PL | 98 | 720 | 0 | 99 | 474 | | | |
| 80 Ac. 0 | | 12 | 0 | | 4 | | | |
| 7,474 Ac. | | 732 | 0 | | 478 | 12 | -35 | RR-5 |
| 114 P Cerro del Oro | | | | | | | | |
| 16,919 Ac. PL | 38 | 2,597 | 12 | 36 | 1,654 | | | |
| 29,654 Ac. 0 | | 4,302 | 0 | | 2,986 | | | |
| 46,573 Ac. | | 6,899 | 12 | | 4,640 | 178 | -33 | RB-5 |
| 121 E Rio Salado West | | | | | | | | |
| 7,531 Ac. PL | 87 | 909 | 36 | 83 | 700 | | | |
| 2,177 Ac. 0 | | 123 | 0 | | 148 | | | |
| 9,708 Ac. | | 1,032 | 36 | | 848 | 19 | -18 | RD-2 |
| 122 E Abeytas | | | | | | | | |
| 2,800 Ac. PL | 48 | 348 | 12 | 59 | 184 | | | |
| 2,617 Ac. 0 | | 372 | 0 | | 126 | | | |
| 5,417 Ac. | | 720 | 12 | | 310 | 2 | -57 | DR-2 |
| 129 E Arroyo Colorado | | | | | | | | |
| 34,550 Ac. PL | 50 | 4,056 | 48 | 45 | 2,861 | | | |
| 37,795 Ac. 0 | | 4,109 | 0 | | 3,479 | | | |
| 72,345 Ac. | | 8,165 | 48 | | 6,340 | 166 | -22 | RR-5 |
| 131 P Los Valles | | | | | | | | |
| 3,379 Ac. PL | 31 | 480 | 12 | 28 | 231 | | | |
| 7,561 Ac. 0 | | 1,080 | 0 | | 583 | | | |
| 10,940 Ac. | | 1,560 | 12 | | 814 | 29 | -48 | RR-3 |
| 152 P Cerro Verde | | | | | | | | |
| 11,511 Ac. PL | 31 | 1,121 | 72 | 36 | 1,028 | | | |
| 20,567 Ac. 0 | | 2,475 | 0 | | 1,828 | | | |
| 32,078 Ac. | | 3,596 | 72 | | 2,856 | 60 | -21 | RB-4 |
| 250 P Milligan Gulch | | | | | | | | |
| 12,949 Ac. PL | 67 | 711 | 12 | 45 | 230 | | | |
| 1,088 Ac. BR | 18 | 192 | 0 | 37 | 192 | | | |
| 3,933 Ac. 0 | | 165 | 0 | | 93 | | | |
| 17,970 Ac. | | 1,068 | 12 | | 515 | 60 | -52 | RR-4 |
| 251 P Harless | | | | | | | | |
| 7,430 Ac. PL | 41 | 1,428 | 0 | 41 | 941 | | | |
| 9,766 Ac. 0 | | 2,040 | 0 | | 1,354 | | | |
| 17,196 Ac. | | 3,468 | 0 | | 2,295 | 86 | -34 | RR-3 |
| 252 P Fernandez-Maestas /2 | | | | | | | | |
| 17,640 Ac. PL | 83 | 1,973 | 48 | 83 | 1,391 | | | |
| 3,645 Ac. 0 | | 404 | 7 | | 293 | | | RR-2 |
| 21,285 Ac. | | 2,377 | 55 | | 1,684 | 74 | -29 | RD-3 |
| 253 E Vigil Ind. | | | | | | | | |
| 3,111 Ac. PL | 100 | 288 | 12 | 100 | 204 | | | |
| 6 Ac. 0 | | 0 | 0 | | 0 | | | |
| 3,117 Ac. | | 288 | 12 | | 204 | 22 | -29 | OR-2 |
| 254 E Bordo Atravesado /3 | | | | | | | | |
| 20,888 Ac. PL | 83 | 2,712 | 0 | 75 | 1,320 | 384 | | |
| 4,275 Ac. 0 | | 564 | 0 | | 444 | 0 | | |
| 25,163 Ac. | | 3,276 | 0 | | 1,764 | 91 | 384/4 -46 | RD-3 |
| 255 E Bosquecito | | | | | | | | |
| 4,723 Ac. PL | 81 | 312 | 0 | 85 | 240 | | | |
| 1,404 Ac. 0 | | 72 | 0 | | 44 | | | |
| 6,127 Ac. | | 384 | 0 | | 284 | 19 | -26 | RO-2 |
| 256 E Llano | | | | | | | | |
| 12,682 Ac. PL | 81 | 1,630 | 145 | 83 | 1,230 | | | |
| 3,105 Ac. 0 | | 374 | 0 | | 244 | | | |
| 15,787 Ac. | | 2,004 | 145 | | 1,474 | 46 | -26 | RR-3 |
| 258 P Ojo De Amado | | | | | | | | |
| 10,916 Ac. PL | 66 | 736 | 8 | 84 | 815 | | | |
| 1,955 Ac. 0 | | 380 | 0 | | 150 | | | |
| 12,871 Ac. | | 1,116 | 8 | | 965 | 36 | -14 | RS-2 |

TABLE A-1(continued)

PROPOSED ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSED GRAZING USE /5 Public Land AUMs% 1/ | PROPOSED GRAZING USE /5 Livestock AUMs | PROPOSED GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| AMPs (cont.) | | | | | | | | |
| 260 P Sierra Larga | | | | | | | | |
| 12,471 Ac. PL | 63 | 2,118 | 36 | 61 | 1,017 | | | |
| 5,924 Ac. 0 | | 1,242 | 0 | | 661 | | | |
| 18,395 Ac. | | 3,360 | 36 | | 1,678 | 82 | -50 | RR-4 |
| 261 E Sheep Canyon /7 | | | | | | | | |
| 19,196 Ac. PL | 51 | 1,382 | 0 | 51 | 1,382 | | | |
| 5,519 Ac. BR | 30 | 804 | 0 | 30 | 804 | | | |
| 5,403 Ac. 0 | | 519 | 0 | | 519 | | | |
| 30,118 Ac. | | 2,705 | 0 | | 2,705 | 79 | 0 | RR-8 |
| 262 P Las Canas | | | | | | | | |
| 12,311 Ac. PL | 53 | 1,558 | 0 | 49 | 1,037 | | | |
| 11,088 Ac. 0 | | 1,382 | 0 | | 1,068 | | | |
| 23,399 Ac. | | 2,940 | 0 | | 2,105 | 67 | -28 | RR-3 |
| 263 P Black Mesa | | | | | | | | |
| 13,654 Ac. PL | 70 | 1,446 | 0 | 56 | 1,072 | | | |
| 7,946 Ac. 0 | | 620 | 0 | | 821 | | | |
| 21,600 Ac. | | 2,066 | 0 | | 1,893 | 86 | - 9 | RD-3 |
| 264 P Armijo Community | | | | | | | | |
| 8,559 Ac. PL | 80 | 976 | 9 | 72 | 821 | | | |
| 2,081 Ac. 0 | | 248 | 0 | | 325 | | | |
| 10,640 Ac. | | 1,224 | 9 | | 1,146 | 38 | - 6 | RD-3 |
| 266 P Coyote Spring | | | | | | | | |
| 11,359 Ac. PL | 86 | 1,512 | 24 | 83 | 1,059 | | | |
| 2,158 Ac. 0 | | 252 | 0 | | 223 | | | |
| 13,517 Ac. | | 1,764 | 24 | | 1,282 | 55 | -27 | RR-4 |
| 268 P Torreon | | | | | | | | |
| 26,367 Ac. PL | 73 | 4,029 | 60 | 76 | 1,928 | | | |
| 9,528 Ac. 0 | | 1,491 | 0 | | 601 | | | |
| 35,895 Ac. | | 5,520 | 60 | | 2,529 | 209 | -54 | RR-4 |
| 271 P Mesa Redonda | | | | | | | | |
| 11,392 Ac. PL | 58 | 2,290 | 21 | 54 | 1,510 | | | |
| 8,763 Ac. 0 | | 1,658 | 18 | | 1,306 | | | |
| 20,155 Ac. | | 3,948 | 39 | | 2,816 | 106 | -29 | RR-4 |
| 272 P San Pasqual River /2 | | | | | | | | |
| 13,016 Ac. PL | 45 | 1,836 | 0 | 46 | 1,922 | | | |
| 6,406 Ac. BR | 44 | 1,800 | 0 | 43 | 1,800 | | | |
| 3,200 Ac. 0 | | 459 | 0 | | 484 | | | RR-3 |
| 22,622 Ac. | | 4,095 | 0 | | 4,206 | 53 | + 3 | RD-2 |
| 275 P Adobe, Hansenburg, Padilla /2 | | | | | | | | |
| 31,921 Ac. PL | 42 | 5,160 | 168 | 40 | 3,035 | | | RB-3 |
| 41,303 Ac. 0 | | 7,224 | 132 | | 4,614 | | | RR-2 |
| 73,224 Ac. | | 12,384 | 300 | | 7,649 | 470 | -38 | RD-3 |
| 276 P C. A. Bar | | | | | | | | |
| 2,360 Ac. PL | 74 | 413 | 87 | 75 | 233 | | | |
| 680 Ac. 0 | | 144 | 0 | | 77 | | | |
| 3,040 Ac. | | 557 | 87 | | 310 | 14 | -44 | CS-1 |
| 277 P San Jose Canyon | | | | | | | | |
| 17,108 Ac. PL | 49 | 1,105 | 30 | 37 | 633 | | | |
| 5,058 Ac. BR | 47 | 1,056 | 0 | 49 | 828 | | | |
| 4,526 Ac. 0 | | 83 | 0 | | 230 | | | |
| 26,692 Ac. | | 2,244 | 30 | | 1,691 | 62 | -25 | RR-3 |
| 279 E Silver Canyon /7 | | | | | | | | |
| 13,437 Ac. PL | 53 | 797 | 0 | 53 | 797 | | | |
| 4,972 Ac. BR | 36 | 540 | 0 | 36 | 540 | | | |
| 2,749 Ac. 0 | | 163 | 0 | | 163 | | | |
| 21,158 Ac. | | 1,500 | 0 | | 1,500 | 53 | 0 | RR-9 |
| 280 P Tecolote Draw | | | | | | | | |
| 13,607 Ac. PL | 68 | 2,073 | 68 | 78 | 1,183 | | | |
| 4,422 Ac. 0 | | 975 | 0 | | 335 | | | |
| 18,029 Ac. | | 3,048 | 68 | | 1,518 | 60 | -50 | RR-4 |
| 283 E Blackington Mountain | | | | | | | | |
| 16,309 Ac. PL | 74 | 2,176 | 0 | 63 | 1,098 | | | |
| 6,551 Ac. 0 | | 765 | 0 | | 642 | | | |
| 22,860 Ac. | | 2,941 | 0 | | 1,740 | 60 | -41 | RR-3 |

TABLE A-1 (continued)

PROPOSED ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSED GRAZING USE /5 Public Land AUMs% 1/ | PROPOSED GRAZING USE /5 Livestock AUMs | PROPOSED GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| AMPs (cont.) | | | | | | | | |
| 284 P Mesa Canyon Well | | | | | | | | |
| 8,740 Ac. PL | 72 | 1,440 | 0 | 74 | 776 | | | |
| 2,922 Ac. 0 | | 552 | 0 | | 274 | | | |
| 11,662 Ac. | | 1,992 | 0 | | 1,050 | 62 | -47 | RR-4 |
| 285 P Sand Mountain | | | | | | | | |
| 21,670 Ac. PL | 78 | 1,910 | 24 | 74 | 1,643 | | | |
| 6,205 Ac. 0 | | 539 | 0 | | 583 | | | |
| 27,875 Ac. | | 2,449 | 24 | | 2,226 | 91 | - 9 | RD-2 |
| 287 E Gabaldon Ind. | | | | | | | | |
| 4,314 Ac. PL | 85 | 264 | 0 | 89 | 167 | | | |
| 800 Ac. 0 | | 48 | 0 | | 19 | | | |
| 5,114 Ac. | | 312 | 0 | | 186 | 14 | -40 | RS-2 |
| 288 E Rio Grande | | | | | | | | |
| 4,506 Ac. PL | 39 | 312 | 0 | 89 | 214 | | | |
| 9 Ac. BR | | 0 | 0 | | 0 | | | |
| 787 Ac. 0 | | 492 | 0 | | 27 | | | |
| 5,302 Ac. | | 804 | 0 | | 241 | 14 | -70 | RS-2 |
| 289 E Jornada Community /7 | | | | | | | | |
| 8,077 Ac. PL | 81 | 1,340 | 60 | 81 | 1,340 | | | |
| 2,593 Ac. 0 | | 280 | 0 | | 280 | | | |
| 10,670 Ac. | | 1,620 | 60 | | 1,620 | 46 | 0 | RR-3 |
| 290 P Rock Springs Canyon | | | | | | | | |
| 7,585 Ac. PL | 61 | 1,344 | 2 | 59 | 1,347 | | | |
| 5,141 Ac. 0 | | 864 | 0 | | 940 | | | |
| 12,726 Ac. | | 2,208 | 2 | | 2,287 | 122 | + 4 | RD-3 |
| 291 P Prairie Spring | | | | | | | | |
| 9,666 Ac. PL | 90 | 1,536 | 0 | 91 | 1,088 | | | |
| 960 Ac. 0 | | 180 | 0 | | 111 | | | |
| 10,626 Ac. | | 1,716 | 0 | | 1,199 | 36 | -30 | RR-3 |
| 293 P Malpais | | | | | | | | |
| 37,425 Ac. PL | 87 | 5,450 | 111 | 87 | 5,287 | | | |
| 5,476 Ac. 0 | | 814 | 0 | | 819 | | | |
| 42,901 Ac. | | 6,264 | 111 | | 6,106 | 144 | -3 | RR-5 |
| 294 P Nogal Canyon | | | | | | | | |
| 4,473 Ac. PL | 46 | 586 | 0 | 21 | 286 | | | |
| 7,058 Ac. 0 | | 688 | 0 | | 1,046 | | | |
| 11,531 Ac. | | 1,274 | 0 | | 1,332 | 77 | + 5 | DR-3 |
| 295 P Antelope Well | | | | | | | | |
| 8,636 Ac. PL | 37 | 996 | 0 | 36 | 448 | | | |
| 12,529 Ac. 0 | | 1,724 | 0 | | 782 | | | |
| 21,165 Ac. | | 2,720 | 0 | | 1,230 | 91 | -55 | CS-2 |
| 297 E Puertecito del Lemitar | | | | | | | | |
| 14,485 Ac. PL | 80 | 1,233 | 0 | 54 | 242 | | | |
| 5,511 Ac. 0 | | 308 | 0 | | 210 | | | |
| 19,996 Ac. | | 1,541 | 0 | | 452 | 38 | -71 | RR-3 |
| 298 P Belcher Corn | | | | | | | | |
| 2,876 Ac. PL | 40 | 636 | 12 | 39 | 314 | | | |
| 4,640 Ac. 0 | | 936 | 0 | | 487 | | | |
| 7,516 Ac. | | 1,572 | 12 | | 801 | 29 | -49 | RR-4 |
| 299 P Pequeno | | | | | | | | |
| 11,342 Ac. PL | 88 | 423 | 0 | 89 | 367 | | | |
| 1,592 Ac. 0 | | 58 | 0 | | 46 | | | |
| 12,934 Ac. | | 481 | 0 | | 413 | 55 | -14 | RS-2 |
| 300 E Lucero Ind. /7 | | | | | | | | |
| 1,579 Ac. PL | 44 | 318 | 0 | 44 | 318 | | | |
| 1,920 Ac. 0 | | 402 | 0 | | 402 | | | |
| 3,499 Ac. | | 720 | 0 | | 720 | 14 | 0 | RR-4 |
| 301 P Bennett-Wilson | | | | | | | | |
| 17,707 Ac. PL | 51 | 3,120 | 11 | 50 | 1,793 | | | |
| 13,996 Ac. 0 | | 3,009 | 0 | | 1,766 | | | |
| 31,703 Ac. | | 6,129 | 11 | | 3,559 | 142 | -42 | RR-3 |
| 303 P Carthage | | | | | | | | |
| 707 Ac. PL | 63 | 76 | 0 | 100 | 78 | | | |
| Exchange of Use | | 44 | 0 | | 0 | | | |
| 707 Ac. | | 120 | 0 | | 78 | 2 | -35 | DR-2 |

TABLE A-1 (continued)

PROPOSED ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSED GRAZING USE /5 Public Land AUMs% 1/ | PROPOSED GRAZING USE /5 Livestock AUMs | PROPOSED GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| AMPs (cont.) | | | | | | | | |
| 306 P Veranito | | | | | | | | |
| 5,131 Ac. PL | 84 | 444 | 0 | 75 | 183 | | | |
| 1,029 Ac. 0 | | 84 | 0 | | 61 | | | |
| 6,160 Ac. | | 528 | 0 | | 244 | 17 | -54 | DR-2 |
| 308 P Padilla Community | | | | | | | | |
| 4,836 Ac. PL | 63 | 289 | 0 | 88 | 142 | | | |
| 691 Ac. 0 | | 167 | 0 | | 19 | | | |
| 5,527 Ac. | | 456 | 0 | | 161 | 22 | -65 | RS-2 |
| 312 E La Arenosa | | | | | | | | |
| 9,403 Ac. PL | 99 | 852 | 0 | 99 | 335 | | | |
| 47 Ac. 0 | | 12 | 0 | | 2 | | | |
| 9,450 Ac. | | 864 | 0 | | 337 | 26 | -61 | RR-3 |
| 315 P Polvadera Community | | | | | | | | |
| 3,507 Ac. PL | 92 | 110 | 0 | 100 | 68 | | | |
| 821 Ac. 0 | | 9 | 0 | | 0 | | | |
| 4,328 Ac. | | 119 | 0 | | 68 | 7 | -43 | CS-1 |
| 317 E San Pedro | | | | | | | | |
| 3,211 Ac. PL | 67 | 285 | 0 | 91 | 95 | | | |
| 534 Ac. 0 | | 140 | 0 | | 9 | | | |
| 3,745 Ac. | | 425 | 0 | | 104 | 36 | -76 | DR-3 |
| 318 E Pueblito Community | | | | | | | | |
| 5,165 Ac. PL | 96 | 370 | 8 | 99 | 290 | | | |
| 163 Ac. 0 | | 14 | 0 | | 2 | | | |
| 5,328 Ac. | | 384 | 8 | | 292 | 14 | -24 | RS-2 |
| 321 P Puertecito Gap | | | | | | | | |
| 5,242 Ac. PL | 41 | 659 | 0 | 33 | 278 | | | |
| 6,331 Ac. 0 | | 949 | 0 | | 565 | | | |
| 11,573 Ac. | | 1,608 | 0 | | 843 | 50 | -48 | RS-2 |
| 322 P Parida | | | | | | | | |
| 10,843 Ac. PL | 56 | 1,258 | 24 | 55 | 1,044 | | | |
| 6,723 Ac. 0 | | 986 | 0 | | 856 | | | |
| 17,566 Ac. | | 2,244 | 24 | | 1,900 | 67 | -15 | RR-3 |
| 323 P Water Canyon | | | | | | | | |
| 7,347 Ac. PL | 54 | 972 | 0 | 47 | 906 | | | |
| 5,970 Ac. 0 | | 828 | 0 | | 1,006 | | | |
| 13,317 Ac. | | 1,800 | 0 | | 1,912 | 118 | + 6 | RS-2 |
| 325 P West Williams | | | | | | | | |
| 9,164 Ac. PL | 66 | 1,710 | 0 | 60 | 893 | | | |
| 4,702 Ac. 0 | | 882 | 0 | | 592 | | | |
| 13,866 Ac. | | 2,592 | 0 | | 1,485 | 48 | -43 | RR-3 |
| 327 P Cedar Pass | | | | | | | | |
| 5,653 Ac. PL | 47 | 1,035 | 0 | 46 | 445 | | | |
| 6,160 Ac. 0 | | 1,185 | 0 | | 526 | | | |
| 11,813 Ac. | | 2,220 | 0 | | 971 | 55 | -56 | RR-3 |
| 328 P Canon Quemado | | | | | | | | |
| 4,490 Ac. PL | 74 | 880 | 0 | 66 | 664 | | | |
| 1,920 Ac. 0 | | 309 | 0 | | 349 | | | |
| 6,410 Ac. | | 1,189 | 0 | | 1,013 | 22 | -15 | RD-3 |
| 330 P East Williams | | | | | | | | |
| 3,112 Ac. PL | 38 | 468 | 0 | 37 | 349 | | | |
| 5,012 Ac. 0 | | 768 | 0 | | 591 | | | |
| 8,124 Ac. | | 1,236 | 0 | | 940 | 43 | -24 | RD-2 |
| 347 P Blue Springs | | | | | | | | |
| 470 Ac. PL | 100 | 84 | 0 | 76 | 13 | | | |
| 114 Ac. 0 | | 0 | 0 | | 4 | | | |
| 584 Ac. | | 84 | 0 | | 17 | 5 | -80 | CS-1 |
| 348 P Cerro Montoso | | | | | | | | |
| 2,198 Ac. PL | 100 | 407 | 0 | 92 | 135 | | | |
| 160 Ac. 0 | | 0 | 0 | | 11 | | | |
| 2,358 Ac. | | 407 | 0 | | 146 | 12 | -64 | RD-2 |

TABLE A-1(continued)

PROPOSEO ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSEO GRAZING USE /5 Public Land AUMs% 1/ | PROPOSEO GRAZING USE /5 Livestock AUMs | PROPOSEO GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| AMPs (cont.) | | | | | | | | |
| 349 P Indian Peak | | | | | | | | |
| 1,311 Ac. PL | 100 | 228 | 0 | 100 | 81 | | | |
| 4 Ac. 0 | | 0 | 0 | | 0 | | | |
| 1,315 Ac. | | 228 | 0 | | 81 | 5 | -64 | CS-1 |
| 360 P Chupadera | | | | | | | | |
| 2,627 Ac. PL | 48 | 299 | 0 | 56 | 353 | | | |
| 1,755 Ac. 0 | | 325 | 0 | | 275 | | | |
| 4,382 Ac. | | 624 | 0 | | 628 | 22 | 0 | RD-2 |
| GRAND TOTALS | | | | | | | | |
| 788,097 Ac. PL | 60 | 97,274 | 1,683 | 58 | 66,239 | 4,557 394 /3 | | |
| 23,052 Ac. BR | | 4,392 | 0 | | 4,164 | | | |
| 456,287 Ac. 0 | | 61,627 | 169 | | 43,701 | | | |
| 1,267,436 Ac. | | 163,293 | 1,852 | | 114,104 | | | |
| NON-AMPs | | | | | | | | |
| 017 Canon Bonito 3,122 Ac. PL | 100 | 408 | 0 | 100 | 171 | 5 | -58 | NA |
| 113 Hidden Mountain 290 Ac. PL | 100 | 36 | 0 | 100 | 19 | 0 | -47 | NA |
| 134 Mesa Aparejo 1,398 Ac. PL | 100 | 108 | 0 | 100 | 77 | 2 | -29 | NA |
| 143 Commanche Arroyo 310 Ac. PL | 100 | 36 | 0 | 100 | 13 | 0 | -64 | NA |
| 145 D-Cross Mountain 3,942 Ac. PL | 100 | 636 | 0 | 100 | 342 | 5 | -46 | NA |
| 165 R. Lucero Ind. 96 Ac. PL | 100 | 12 | 0 | 100 | 8 | 0 | -33 | NA |
| 267 Ball Ind. 2,448 Ac. PL | 100 | 420 | 0 | 100 | 318 | 10 | -21 | NA |
| 281 Culbreath Ind. 5,714 Ac. PL | 100 | 1,185 | 12 | 100 | 903 | 38 | -24 | NA |
| 282 Dean Ind. 960 Ac. PL | 100 | 60 | 0 | 100 | 39 | 5 | -35 | NA |
| 296 Hudgins Ind. 6,324 Ac. PL | 100 | 741 | 0 | 100 | 836 | 26 | +13 | NA |
| 310 Orndorff Ind. 1,374 Ac. PL | 100 | 201 | 0 | 100 | 146 | 7 | -27 | NA |
| 340 Bishop Ind. 2,085 Ac. PL | 100 | 392 | 3 | 100 | 252 | 10 | -36 | NA |
| 341 Brazil Ind. 106 Ac. PL | 100 | 23 | 0 | 100 | 11 | 0 | -52 | NA |
| 342 Bryan Ind. 1,654 Ac. PL | 100 | 300 | 10 | 100 | 224 | 10 | -25 | NA |
| 343 Chilton Ind. 1,543 Ac. PL | 100 | 267 | 0 | 100 | 144 | 10 | -46 | NA |
| 345 Hatley Ind. 1,193 Ac. PL | 100 | 203 | 0 | 100 | 138 | 5 | -32 | NA |
| 350 South Rainwater 1,350 Ac. PL | 100 | 238 | 0 | 100 | 218 | 7 | -8 | NA |
| 351 Rienhardt Ind. 1,580 Ac. PL | 100 | 228 | 0 | 100 | 148 | 7 | -35 | NA |
| 352 Sais Ind. 3,798 Ac. PL | 100 | 624 | 8 | 100 | 433 | 19 | -31 | NA |
| 353 Sanchez Ind. 1,460 Ac. PL | 100 | 276 | 0 | 100 | 133 | 7 | -52 | NA |

TABLE A-1 (continued)

PROPOSED ACTION



| Allotment and Acreage | PRESENT GRAZING USE Public Land AUMs% 1/ | PRESENT GRAZING USE Livestock AUMs | PRESENT GRAZING USE Wildlife AUMs | PROPOSEO GRAZING USE /5 Public Land AUMs% 1/ | PROPOSEO GRAZING USE /5 Livestock AUMs | PROPOSEO GRAZING USE /5 Wildlife AUMs | Proposed Change in Livestock AUMs % | Type of Grazing System and Number of Pastures 2/ |
|---|---|---|---|---|---|---|---|---|
| NON-AMPs | | | | | | | | |
| 354 Spears Shipping Pasture 80 Ac. PL | 100 | 24 | 0 | 100 | 0 | 0 | -100 | NA |
| 355 Strozzi Ind. 1,715 Ac. PL | 100 | 293 | 0 | 100 | 432 | 17 | +47 | NA |
| 356 Wallace Ind. 581 Ac. PL | 100 | 72 | 0 | 100 | 0 | 2 | -100 | NA |
| 358 Creel Ind. 2,376 Ac. PL | 100 | 370 | 0 | 100 | 315 | 7 | -15 | NA |
| 361 C. A. Bar Ind. 480 Ac. PL | 100 | 115 | 18 | 100 | 33 | 2 | -71 | NA |
| 362 N. Rainwater Ind. 163 Ac. PL | 100 | 24 | 0 | 100 | 8 | 0 | -67 | NA |
| Total 46,142 | | 7,292 | 51 | | 5,361 | 201 | | |
| ELIMINATION OF GRAZING | | | | | | | | |
| 2B6 Fullingim Ind. /4 376 Ac. PL | 100 | 16 | 0 | 100 | 0 | 2 | -100 | NA |
| 302 Marshall Ind. /4 375 Ac. PL | 100 | 48 | 0 | 100 | 0 | 0 | -100 | NA |
| 311 Owen Ind. /4 109 Ac. PL | 100 | 24 | 0 | 100 | 0 | 1 | -100 | NA |
| 357 San Lorenzo /4 1,127 Ac. PL | 100 | 24 | 0 | 100 | 0 | 38 | -100 | NA |
| Total 1,987 | | 112 | 0 | | 0 | 41 | | |
| UNALLOTTED AREAS | | | | | | | | |
| 164 Rio Puerco /4 203 Ac. PL | 100 | 0 | 0 | 100 | 0 | 3 | 0 | NA |
| 363 San Antonio /4 2,379 Ac. PL | 100 | 0 | 0 | 100 | 0 | 0 | 0 | NA |
| Total 2,582 | | 0 | 0 | | 0 | 3 | | |
| GRAND TOTALS | | | | | | | | |
| 838,808 Ac. PL | | 104,678 | 1,734 | | 71,600 | 4,802 | 384 | |
| 23,052 Ac. BR | | 4,392 | 0 | | 4,164 | 0 | 0 | |
| 456,287 Ac. 0 | | 61,627 | 169 | | 43,701 | 0 | 0 | |
| 1,318,147 Ac. /6 | | 170,697 | 1,903 | | 119,465 /5 | 4,802 | 384 /4 | |

/1 = Livestock AUMs
/2 = The three AMPs having more than one grazing system are listed under the system with the greatest number of AUMs. Numbers following abbreviations indicate the number of pastures in the grazing system.
/3 = The Bordo Atravesado Allotment has a small band of wild horses. Based on our present estimate of 32 horses, 384 AUMs of forage would be set aside for their needs.
/4 = All forage produced on these allotments is available for wildlife use.
/5 = Livestock and wildlife AUMs for each allotment do not always add up to total range survey AUMs because of deductions for potentially suitable, unsuitable, and uncontrolled lands.
/6 = Does not include 332,067 acres of private and State land in non-AMP areas.
/7 = Proposed grazing use for these allotments was based on actual use, utilization, and trend studies rather than the range survey.

RR - Rest Rotation
CS - Continuous Seasonal
NA - Not Applicable
RD - Rotational Oeferment
RS - Rotational Seasonal
RB - Scheduled Rest-Best Pasture
OR - Oeferred Rotation
P - Proposed AMP
PL = Public Land
BR = Bureau of Reclamation
0 = Other
E = Existing AMP

Source: Socorro Oistrict Grazing Files and Proposed AMPs

## RANGE SURVEY METHODS

Range Survey Methodology

The survey procedure used to determine the grazing capacity for grazing animals in the ES Area was the Ocular Reconnaissance Forage Survey Method (BLM Manual 4412.11A).

In August of 1975, BLM Socorro District employees initiated the survey of the area. The survey was completed in December of 1977.

The ocular reconnaissance forage survey consists of two major components. These are the field data collection and the analysis and compilation of the data. The steps involved in this survey are as follows:

1) Vegetative types and subtypes are delineated on aerial photos at a scale of 1:31,680 (1 inch = 2 miles). Types are delineated on the basis of density, species composition, slope, exposure, erosion, and other factors. The resulting mapped types are relatively homogenous vegetative units.

2) After a vegetative type or subtype unit is mapped, the following data is collected: plant species' composition and density, ground cover (litter, bare ground, small or large rock, vegetation), and any reductions in forage allocations needed because of slope, rockiness, lack of water, or other physical limitations to grazing an area.

The data gathering process was done utilizing the Step-Point method. This involves pacing off 100 points along a predetermined transect. A range conservationist, generally the individual who mapped the unit, selects an area that in his judgment is representative of the vegetative type or subtype. At each point along the transect he makes a reading, recording hits by a notch on the toe of his boot. At least two transects are run in each representative area. At the end of the transect the vegetative hits are tabulated. This gives the density of the type. He also tabulates the species hit, or those closest to the notch, to get species composition. See Figure A-1, p. A-10 (Record of Pace Transect) and Figure A-3, p. A-12 (Form 4412-1). These show actual data from a vegetative subtype delineated on Allotment 293.

Erosion conditions of each vegetative type were simultaneously collected. The method used was BLM's Phase I of the Watershed Conservation and Development System (BLM Manual 7322). Seven factors (soil movement, surface litter, surface rock, pedestalling, flow patterns, rills and gullies) were used to determine erosion condition. The observer used Form 7310-12 (Figure A-2, p. A-11) to numerically rate each of these factors. The descriptions on the form that came closest to fitting the situation of the area for each factor determined the numerical rating assigned. The total of all the numerical ratings then reflected the erosion condition class of the unit.

3) A proper use factor (PUF) was determined for each vegetative species.

A PUF represents the average weight percentage of a particular plant species, in relation to all other species, that can be safely grazed without restricting forage capacity production. Certain forage species are preferred above others; therefore, PUFs of each species vary according to grazing animals' preference, and range in value from 0 to 60. Form 4412-1, A-12, shows PUFs for species found on a transect site within Allotment 293.

4) A forage acre requirement (FAR) for the area is then determined.

The Socorro District calculated three FARs for the ES Area. This was done because of the three broad-land forms and vegetative types in the area. Six existing AMP allotments (081, 086, 261, 279, 289, and 300) were used to calculate the three FARs. Allotments 081 and 086 were used to represent the northern grassland and pinyon-juniper portion of the area. Allotments 261 and 279 were used to represent the creosote and river breaks in the central portion of the area. Allotments 289 and 300 were used to represent the southern grassland and upland pinyon-juniper areas. The FARs used were 0.32, 0.22, and 0.25, respectively, for each area discussed above. The formula A/B = C was used where A = number of forage acres; B = actual use; and C = forage acre requirement. The specific data and calculations can be reviewed in the files at the

BLM Socorro District Office.

5) The following calculations were performed for each vegetative type or subtype, Vegetative subtype number HT-40, as shown on Form 4412-1 (Figure A-3, p. A-12) was used in the following example.

Proper Use Factor (PUF) x Percent Composition = Average PUF

Total Average PUFs (.395) x Average Density (.13) = Forage Acre Factor (.051)

Forage Acre Factor (.051) x Percent of Area Utilizable (100) = Net Forage Acre Factor (.051)

Forage Acre Requirement (.25) ÷ Net Forage Acre (.051) Factor = Acres/AUM (4.9)

Vegetative Type or Subtype Area (Acres) (1,256.92) ÷ Acres/AUM (4.9) = Total AUMs for vegetative subtype (256.5)

The total AUMs for each vegetative type or subtype within the allotment are then totaled to determine the total AUMs for the allotment. The summary of range survey (Figure A-4, p. A-13) shows by land ownership for Allotment 293 total AUMs by transect for all transects in the allotment. The proposed grazing use shown on Table A-1, p. A-4 for Allotment 293 is the amount of forage allocated to livestock after allocations were made for wildlife and deductions were made for suitability.

Determination of Rangeland Suitability for Livestock Grazing

All rangeland in the ES Area was classified as to its suitability to support livestock grazing use.

The criteria used in suitability determinations for each vegetative type or subtype were: 1) distance from water; 2) slope or other physical barriers; 3) forage production; and 4) future and present erosion condition (Figure A-5, p. A-14). Each of the criteria is evaluated independently or in various combinations to arrive at one of three classes - suitable, potentially suitable, or unsuitable.

The three suitability classes are defined as follows:

Suitable ranges are areas which can be grazed by livestock without damage to the soil and vegetative resources.

Potentially suitable ranges are areas not currently suitable for livestock grazing because of 1) erosion conditions, 2) low production of perennial forage, 3) inaccessibility to livestock, and/or 4) lack of water for proper utilization by livestock. These areas may be made suitable by treatment, natural improvement, or development of stock trails or water. The assignment of forage for livestock would not be made until the area becomes suitable for grazing.

Unsuitable ranges are areas which are neither currently nor potentially suitable for livestock grazing because of: 1) extreme steepness of slope or other physical barriers; 2) erosion or inherent erosiveness of the soil which cannot be corrected through treatment or management; and 3) low production of perennial forage with little or no potential to improve through either treatment or management.

Figure A-5, p. A-14, Range Suitability Standards key, was used in determining range suitability classification. Vegetative subtype number HT-40 (Figure A-3, p. A-12) was classified as suitable for livestock grazing. The type is on a less than 5-percent slope; current production of usable perennial forage is 4.9 acres/AUM; the present soil surface factor is 27 (Figure A-2, p. A-11); and the type is within four miles of reliable water.

# RECORD OF PACE TRANSECT - Figure A-1

(1) Transect No. HT-40 | (2) Allotment 293 | (3) District 02

Date 10/10/75 | (5) Examiner | (6) Veg. Sub. Type Desert Shrub | (7) % Veg. Sub. Type | (8) Exposure West

(9) Effective Root Depth | (10) ¼" = 4" Soil Texture | (11) 4" + | (12) SSF | (13) % Slope | (14) Primary Treatment

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Gusa | Spco | Spfl | Gusa | Spfl | Spco | Gusa | Gusa | Gusa | Spco | Spco | Boer | Spco | Spfl | Spfl | Spfl | Spfl | Hija | Hija | Eptr | Spfl | Spco | Hija | Spfl | Spfl |
| S | S | S | S | S | S | S | X | S | S | S | S | S | S | S | L | S | S | S | S | S | S | S | S | L |
| 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 |
| Spfl | Hija | Spfl | Mupo | Spfl | Gusa | Hija | Boer | Spfl | Spco | Spfl | Spco | Spfl | Spfl | Boer | Spco | Spfl | Spco | Spfl | Spco | Spfl | Spfl | Yucc. | Eptr. | Hija |
| S | S | S | L | S | S | S | S | S | S | S | S | S | S | X | L | S | S | S | X | S | L | X | X | S |
| 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 |
| Spfl | Spfl | Hija | Arfi | Yucc | Gusa | Spfl | Spfl | Gusa | Eptr. | Spco | Arfi | Spfl | Arfi | Hija | Spfl | Spfl | Yucc | Spco | Spfl | Gusa | Yucc | Hija | Spfl | Spco |
| S | S | L | X | X | S | S | S | S | S | S | L | S | S | S | S | S | L | S | S | S | X | S | S | S |
| 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 |
| Boer | Spfl | Hode | Eptr | Arfi | Spfl | Arfi | Spfl | Yucc | Boer | Spfl | Boer | Hija | Boer | Arfi | Arfi | Spfl | Spfl | Spfl | Hija | Hija | Spco | Boer | Spfl | Spco |
| S | S | S | X | X | S | L | S | X | S | S | L | L | S | X | L | S | S | S | S | S | S | X | S | S |

List usable forage hits in upper half of block using four letter plant symbol. (L) Litter; (S) Bare Ground; (SR) Rock < 2" Diameter; (A) Annual Plant; (LR) Large Rock > 2" Diameter. List all non-usable vegetation by symbol in the bottom half of blocks.

## B SUMMARY OF PART A

Density = 13%

| | No. of Hits |
|---|---|
| (1) Forage (Upper Half of Block) | 8 |
| (2) Vegetation (Lower Half of Block) | 12 |
| (3) (15) + (16) = Total Vegetation | 37 |
| (4) Litter | 16 |
| (5) Bare Ground | 1 |
| (6) Small Rock | 1 |
| (7) Large Rock | 9 |

## C LIST OF USABLE FORAGE

| (22) Plant Name | | (23) Symbol | (24) Key Forage Plant | (25) No. of Hits | (26) Comp. % |
|---|---|---|---|---|---|
| Boer | Arfi | 7 | | | |
| Hija | Yucc | 5 | | | |
| Spfl | Eptr | 4 | | | |
| Spco | | | | | |
| Mupo | | | | | |
| Hode | | | | | |
| Gusa | | | | | |

*Vegetative codes are explained in Appendix 2, Table A-4, p. A-36

L= Litter
S= Soil
X= Vegetative Hit of Species

## D WILDLIFE

| | No. |
|---|---|
| (7) Pellet Groups (5' x 135 Paces) Total | |
| (8) Elk | |
| (9) Deer | |
| (10) Antelope | |
| (11) Game Birds Sighted No. & Species | |
| (12) Ocular Estimate of Browse Species | |
| (13) Species % | |
| (14) | |

## E TREND

| | Values | |
|---|---|---|
| (35) Vigor | | |
| (36) Reproduction | | |
| (37) Total | | |
| Apparent Trend | | |
| (39) 0 to 33 Improving | | |
| (40) 34 to 66 Static | | |
| (41) 67 to 100 Declining | | |

(42) PHOTO TAKEN ☐ YES ☐ NO

SIZE PLOT ☐ 3x3 ☐ 5x5

Form 7310-12
(May 1973)

UNITED STATES
DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

By

Date 10-10-75

Location Allotment 293

Treatment affecting the SSF

## DETERMINATION OF EROSION CONDITION CLASS

SOIL SURFACE FACTORS (SSF)

| | | | | | |
|---|---|---|---|---|---|
| SOIL MOVEMENT * | No visual evidence of movement<br>0 1 2 3 | Some movement of soil particles<br>4 (5) | Moderate movement of soil is visible and recent. Slight terracing generally less than 1" in height.<br>6 7 8 | Occurs with each event. Soil and debris deposited against minor obstructions.<br>9 10 11 | Subsoil exposed over much of area, may have embryonic dunes and wind scoured depressions<br>12 13 14 |
| SURFACE LITTER * | Accumulating in place<br>0 1 2 3 | May show slight movement<br>4 (5) 6 | Moderate movement is apparent, deposited against obstacles<br>7 8 | Extreme movement apparent, large and numerous deposits against obstacles<br>9 10 11 | Very little remaining *(use care on low productive sites)*<br>12 13 14 |
| SURFACE ROCK * | If present, the distribution of fragments show no movement caused by wind or water<br>0 1 (2) | If present, coarse fragments have a truncated appearance or spotty distribution caused by wind or water<br>3 4 5 | If present, fragments have a poorly developed distribution pattern caused by wind or water<br>6 7 8 | If present, surface rock or fragments exhibit same movement and accumulation of smaller fragments behind obstacles<br>9 10 11 | If present, surface rock or fragments are dissected by rills and gullies or are already washed away<br>12 13 14 |
| PEDES-TALLING * | No visual evidence of pedestalling<br>0 1 2 (3) | Slight pedestalling, in flow patterns<br>4 5 6 | Small rock and plant pedestals occurring in flow patterns<br>7 8 9 | Rocks and plants on pedestals generally evident, plant roots exposed<br>10 11 | Most rocks and plants pedestalled and roots exposed<br>12 13 14 |
| FLOW PATTERNS * | No visual evidence of flow patterns<br>(0) 1 2 3 | Deposition of particles may be in evidence<br>(4) 5 6 | Well defined, small, and few with intermittent deposits<br>7 8 9 | Flow patterns contain silt and sand deposits and alluvial fans<br>10 11 12 | Flow patterns are numerous and readily noticeable. May have large barren fan deposits.<br>13 14 15 |
| RILLS | No visual evidence of rills<br>(0) 1 2 3 | Some rills in evidence at infrequent intervals over 10'<br>4 5 6 | Rills ½" to 6" deep occur in exposed places at approximately 10' intervals<br>7 8 9 | Rills ½" to 6" deep occur in exposed area at intervals of 5 to 10'<br>10 11 12 | May be present at 3" to 6" deep at intervals less than 5'<br>13 14 |
| GULLIES | May be present in stable condition. Vegetation on channel bed and side slopes<br>0 1 2 3 | A few gullies in evidence which show little bed or slope erosion. Some vegetation is present on slopes.<br>4 5 6 | Gullies are well developed with active erosion along less than 10% of their length. Some vegetation may be present.<br>7 8 9 | Gullies are numerous and well developed with active erosion along 10 to 50% of their lengths or a few well developed gullies with active erosion along more than 50% of their length<br>10 11 12 | Sharply incised gullies cover most of the area and over 50% are actively eroding<br>13 14 15 |

| SITUATION | TOTAL | |
|---|---|---|
| Slight | 27 | $\frac{19}{71} \times 100 = 27$ |

*Erosion Condition Classes: Stable 0–20; Slight 21–40; Moderate 41–60; Critical 61–80; Severe 81–100*

*(Instructions on reverse)*

Figure A-2

Form 4412-1
(November 1970)

U.S. DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

Writeup No. HT-40

Date 10-10-75

Aerial Photo No.

Figure A-3

FORAGE SURVEY TYPE WRITEUP
(OCULAR RECONNAISSANCE METHOD)

| Examiner | KIND OF GRAZING ANIMAL * | SEASON OF USE | SECTIONS | TWP. | RGE. | MER. |
|---|---|---|---|---|---|---|
| Type 16-Yucc-Spfl-Spco | Cattle, Deer, | YL | | | | |
| Ac/AUM 4.9 | Antelope | | | | | |

| | SPECIES | TOTAL ALLOWABLE PUF | % COMPOSITION | CATTLE PUF | COMP. X C PUF | SHEEP PUF | COMP. X S PUF | DEER PUF | COMP. X D PUF | PUF | COMP. X ___ PUF |
|---|---|---|---|---|---|---|---|---|---|---|---|
| GRASSES | Spfl | 50 | 37 | | .185 | | | | | | |
| | Hija | 45 | 12 | | .054 | | | | | | |
| | Boer | 55 | 8 | | .044 | | | | | | |
| | Spco | 50 | 16 | | .080 | | | | | | |
| | Spgi | -- | T | | -- | | | | | | |
| | Mupo | 45 | 1 | | .005 | | | | | | |
| | Trpu | -- | T | | -- | | | | | | |
| | Aris | -- | T | | -- | | | | | | |
| | SUBTOTAL | | 74 | | | | | | | | |
| FORBS | Hode | 30 | 1 | | .003 | | | | | | |
| | SUBTOTAL | | 1 | | | | | | | | |
| SHRUBS | Yucc | 15 | 5 | | .008 | | | | | | |
| | Arfi | 10 | 7 | | .007 | | | | | | |
| | Gusa | 1 | 9 | | .001 | | | | | | |
| | Eptr | 20 | 4 | | .008 | | | | | | |
| | SUBTOTAL | | 25 | | | | | | | | |
| | TOTALS | | 100 | | .395 | | | | | | |

*Vegetative codes are explained in Appendix 2, Table A-4, p. A-36

Av C PUF .395 × Av Den 13 = FAF .051 × 100 % Util = Net FAF .051 ; FAR .25 ÷ Net FAF .051 = 4.9 Ac/AUM

Av S PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____ ; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Av D PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____ ; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Av PUF ____ × Av Den ____ = FAF ____ × ____ % Util = Net FAF ____ ; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

Total Net FAF ____ ; FAR ____ ÷ Net FAF ____ = ____ Ac/AUM

*Livestock and major game species. *(Other game species making inappreciable use are:*

## SUMMARY OF RANGE SURVEY BY ALLOTMENT

Figure A-4

ALLOTMENT NO: 293 ALLOTMENT NAME: Malpais DATE: 12/1/77

| Range Type No. | Veg. Type | Acre/ AUM | Federal Range | | State | | Patented | | Other Federal Uncontrolled | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | Acres | AUMs | Acres | AUMs | Acres | AUMs | Acres | AUMs | Acres | AUMs |
| BH-35 | 17 | 9.6 | 378 | 39.38 | | | | | 8 | 0.83 | 386 | 40.21 |
| BH-36 | 4 | 4.4 | 2,086.56 | 474.22 | | | | | 72 | 16.36 | 2,158.56 | 490.58 |
| BH-38 | 1 | 6.4 | 400 | 62.5 | 55 | 8.59 | 29 | 4.53 | | | 484 | 75.62 |
| BH-40 | 1 | 3.7 | 281 | 75.95 | 130 | 35.14 | | | | | 411 | 111.09 |
| BH-41 | 1 | 9.6 | 119 | 12.39 | | | 25 | 2.6 | | | 144 | 14.99 |
| BH-42 | 1 | 7.6 | 1,774.28 | 233.46 | 32 | 4.21 | 31 | 4.08 | | | 1,837.28 | 241.75 |
| BH-67 | 1 | 6.3 | 212 | 33.65 | | | | | | | 212 | 33.65 |
| BH-80 | 4 | 5.7 | 8 | 1.4 | | | | | | | 8 | 1.4 |
| BH-82 | 16 | 7.4 | 53 | 7.16 | | | | | | | 53 | 7.16 |
| HT-26 | 4 | 5.2 | 283.25 | 34.47 | 182 | 35 | | | | | 465.25 | 89.47 |
| HT-27 | 13 | 10.4 | 835.72 | 80.36 | | | | | | | 835.72 | 80.36 |
| HT-28 | 4 | 4.7 | 963.55 | 205.01 | | | | | | | 963.55 | 205.01 |
| HT-29 | 4 | 3.5 | 225 | 64.29 | 248 | 70.85 | | | | | 473 | 135.14 |
| HT-30 | 4 | 14.7 | 678.2 | 46.14 | 71 | 4.83 | | | | | 749.2 | 50.97 |
| HT-31 | 16 | 6.9 | 305 | 44.2 | 293 | 42.46 | | | | | 598 | 86.66 |
| HT-32 | 4 | 10.4 | 938 | 90.19 | | | | | | | 938 | 90.19 |
| HT-33 | 1 | 9.3 | 1,366 | 146.88 | | | | | | | 1,366 | 146.88 |
| HT-34 | 1 | 5.8 | 29 | 5.0 | | | | | | | 29 | 5.0 |
| HT-35 | 1 | 5.8 | 118 | 20.34 | 78 | 13.45 | | | | | 196 | 33.79 |
| HT-36 | 4 | 4.4 | 4,242.57 | 964.22 | 1,187.88 | 269.97 | | | | | 5,430.45 | 1,234.19 |
| HT-37 | 16 | 4.9 | 2,681.19 | 547.18 | 74 | 15.1 | 9 | 1.84 | | | 2,764.19 | 564.12 |
| HT-38 | 4 | 6.6 | 1,555.78 | 235.72 | 640 | 96.97 | | | | | 2,195.78 | 332.69 |
| HT-39 | 16 | 6.8 | 585 | 86.03 | | | | | | | 585 | 86.03 |
| HT-40 | 16 | 4.9 | 1,233.92 | 251.82 | 23 | 4.69 | | | | | 1,256.92 | 256.51 |
| LV-1 | 1 | 13.9 | 119 | 8.56 | | | 108 | 7.77 | | | 227 | 16.33 |
| TB-1 | 1 | 3.6 | 163 | 45.28 | | | | | | | 163 | 45.28 |
| T8-2 | 16 | 4.1 | 501 | 122.19 | 19 | 4.63 | | | | | 520 | 126.82 |
| T8-3 | 4 | 4.4 | 795 | 180.68 | | | | | | | 795 | 180.68 |
| TD-65 | 1 | 10.9 | 6,245.78 | 573.01 | 412.08 | 37.8 | 23 | 2.11 | | | 6,680.86 | 612.92 |
| TD-66 | 1 | 11.4 | 8,205.68 | 719.79 | 1,710.6 | 150.05 | 15 | 1.32 | | | 9,931.28 | 871.16 |
| Barren | | | 44 | | | | | | | | 44 | |
| TOTAL | | | 37,425.48 | 5,431.47 | 5,155.56 | 793.74 | 240 | 24.35 | 80 | 17.19 | 42,901.04 | 6,266.65 |

Proposed Grazing Use = Total AUMs (6,267 AUMs) - Wildlife AUMs (144 AUMs) - Uncontrolled (17 AUMs)

Proposed Grazing Use = 6,106 AUMs (Table A-1, p. A-4)

Source: Range Survey File for Allotment 293, Socorro District Office

FIGURE A-5

RANGE SUITABILITY STANDARDS

| Suitability Element | Recommended | Suitability |
|---|---|---|
| 1. Percent slope is greater than | 50% | U - Inaccessible |
| 1. Percent slope is less than | 50% | |
| 2. Current production of usable perennial forage is not | 32 Ac/AUM | |
| sufficient to provide grazing capacity of less than | (25 lbs/ac) | |
| 3. Potential production (either through management or treatment) of usable perennial forage is not sufficient to provide grazing capacity of less than | 32 Ac/AUM | U - Low Production |
| 3. Potential production (either through management or treatment) of usable perennial forage is sufficient to provide grazing capacity of less than | 32 Ac/AUM | |
| 4. Present SSF is greater than | 60 SSF | |
| 5. Potential SSF is greater than | 60 SSF | U - Erosion |
| 5. Potential SSF is less than | 60 SSF | |
| 6. Potential SSF is more than | 50 SSF | |
| 7. Slope greater than | 20% | U - Erosion & Slope |
| 7. Slope less than | 20% | PS - Erosion |
| 6. Potential SSF is less than | 50 SSF | To Table 1 - Erosion |
| 4. Present SSF is less than | 60 SSF | |
| 8. Present SSF more than (less than 60) | 50 SSF | |
| 9. Potential SSF more than (less than 60) | 50 SSF | |
| 10. Slope greater than | 20% | U - Erosion |
| 10. Slope less than | 20% | PS - Erosion |
| 9. Potential SSF less than | 50 SSF | To Table 1 - Erosion |
| 8. Present SSF less than | 50 SSF | To Table 1 - Low Production |
| 2. Current production of usable perennial forage is sufficient to provide grazing capacity of less than | 32 Ac/AUM | |
| 11. Present SSF is greater than | 60 SSF | |
| 12. Potential SSF is greater than | 60 SSF | U - Erosion |
| 12. Potential SSF is less than | 60 SSF | |
| 13. Potential SSF is more than | 50 SSF | |
| 14. Slope greater than | 20% | U - Erosion |
| 14. Slope less than | 20% | PS - Erosion |
| 13. Potential SSF less than | 50 SSF | To Table 1 - Erosion |
| 11. Present SSF is less than | 60 SSF | |
| 15. Present SSF more than (less than 60) | 50 SSF | |
| 16. Potential SSF more than | 50 SSF | |
| 17. Slope greater than | 20% | U |
| 17. Slope less than | 20% | PS - Erosion |
| 16. Potential SSF less than | 50 SSF | |
| 18. Distance from reliable water is more than | 4 miles | To Table 1 - Water |
| 18. Distance from reliable water is less than | 4 miles | To Table 2 |
| 15. Present SSF less than | 50 SSF | |
| 19. Distance from reliable water is more than | 4 miles | To Table 1 - Water |
| 19. Distance from reliable water is less than | 4 miles | To Table 2 |

PS = Potentially Suitable
U = Unsuitable

TABLE 1

WATER MORE THAN 4 MILES
SUITABILITY DETERMINATIONS

| Slope Percent | Distance Up Slope | Potentially Suitable | Unsuitable |
|---|---|---|---|
| 0%-20% | to 4 miles | X | |
| | over 4 miles | | X |
| 21%-30% | to 0.6 miles | X | |
| | over 0.6 miles | | X |
| 31%-40% | to 0.4 miles | X | |
| | over 0.4 miles | | X |
| 41%-50% | to 0.3 miles | X | |
| | over 0.3 miles | | X |
| 51% | | | X |

TABLE 2

WATER LESS THAN 4 MILES
SUITABILITY DETERMINATIONS

| Slope Percent | Distance Up Slope | Suitable | Unsuitable |
|---|---|---|---|
| 0%-20% | to 4 miles | X | |
| | over 4 miles | | X |
| 21%-30% | to 0.6 miles | X | |
| | over 0.6 miles | | X |
| 31%-40% | to 0.4 miles | X | |
| | over 0.4 miles | | X |
| 41%-50% | to 0.3 miles | X | |
| | over 0.3 miles | | X |
| 51% | | | X |

Source: USDI - BLM Instruction Memo No. 78-134

Methodology for Determining Existing Deer and Existing and Predicted Antelope Numbers

The existing wildlife numbers were computed from maps showing deer and antelope density, habitat trend, and population trend. These maps were included in the New Mexico Department of Game and Fish (NMOG&F) Comprehensive Plan, 1978. The number of deer or antelope on an allotment was developed by multiplying the density times the number of units of area (deer were in sections, antelope in 1,000 acres) found on the allotment. Allotment 293 is located in the White Sands Herd Unit. NMOG&F estimate the deer density of this unit to be .25 deer per section and the antelope density to be 1 antelope per 1,000 acres. Allotment 293 contains 42,901 acres (67 sections). Big game numbers were computed to be:

.25 deer/section x 67 sections = 16.7 or 17 deer.

1 antelope/1,000 acres x 42,901 acres = 42.9 or 43 antelope

Once existing big game numbers were determined, NMOG&F trend data was used to determine deer and antelope numbers for 1985. NMOG&F trend data for the White Sands Herd Unit predicted deer and antelope numbers to remain stable by 1985. Therefore, for Allotment 293, 1985 big game numbers were computed to be:

No change in deer numbers, or 17 deer

No change in antelope numbers, or 43 antelope

Total big game 60

For the Proposed Action, forage was assigned to wildlife on each allotment according to the big game numbers predicted for 1985. This was done because the proposed livestock reductions would not be completed until 1984; NMDG&F trend data was based on 1985 predictions; so rather than re-allocate forage in 1985 for the predicted increases in big game, forage would be reserved during the reduction period and the estimated deer and antelope would have their forage requirements satisfied.

A conversion factor of five deer and/or antelope to one cow was used to determine AUMs needed on each allotment. The number of AUMs to be allocated for big game on Allotment 293 was computed as follows;

Total deer and antelope (60) ÷ Conversion factor (5) = Animal Units (12)

Animal Units (12) x Months (12) = AUMs (144)

The wildlife (big game) AUMs allocated for Allotment 293 (144 AUMs) are shown on Table A-1, p. A-4.

The change in antelope and deer numbers from the Proposed Action was predicted by the BLM Wildlife Biologist. Deer numbers in the ES Area did not appear to be impacted significantly by livestock grazing and were not predicted to increase. Antelope numbers were predicted to increase with the Proposed Action. This increase was determined through the use of a mathematical formula (shown below) that included the number of does and bucks in the population, percent of hunter harvest, natural mortality, and fawn/doe ratio. This formula predicted the yearly increase and was repeated 15 times to develop the prediction for the year 2000. For Allotment 293 antelope numbers are predicted to increase to 52 by the year 2000. The number of AUMs to be allocated to big game for Allotment 293 at the year 2000 was computed as follows:

Where:

Deer numbers = 17 (no change for existing)
Antelope numbers = 52
Total deer and antelope (69) ÷ Conversion Factor (5) = Animal Units (13.8)
Animal Units (13.8) x Months (12) = AUMs (166)

Mathematical Formulas for Predicted Antelope Increases for Proposed Action[1/]

Assume: Proper Age Class and Structure

Sex Ratio of fawn doe to fawn buck would be 1:1

Variables:

[2/] Number of Does in First Year = X

Number of Does in 2nd Year = $X_2$

[2/] Number of Bucks in First Year = Y

Number of Bucks in Second Year = $Y_2$

B = % Harvest (Bucks) 30%

D = % Losses due to natural mortality = 20%

[2/] G = Fawns per doe = .5

Does:

(X)(D) = F Does dying due to natural mortality

X-F = J Number of does available at breeding season

Assume: All does are capable of breeding

(J)(G)÷ 2 = H Number of either doe or buck fawns

$X_1$ = H = $X_2$ Doe totals for the year

Bucks:

($Y_1$)(D) = E Bucks dying due to natural mortality

$X_1$ ÷ 4 = Z Number of bucks needed for reproduction, assuming all are capable.

$Y_1$-E-Z = W Number of bucks available to harvest, assuming buck only hunting.

(W)(B) = C Number of bucks harvested

$Y_1$-E-C = 1 Number of bucks available at breeding time

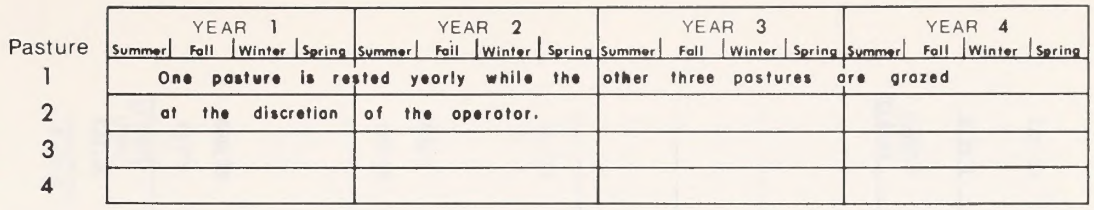
$Y_1$ + H = $Y_2$ Buck totals for the year

Total Antelope Numbers:

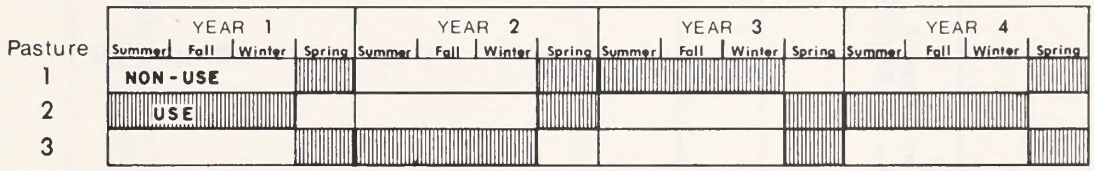
$X_2$ + $Y_2$ = Total Antelope Numbers

1/ Mathematical Formula developed in Socorro District Office.

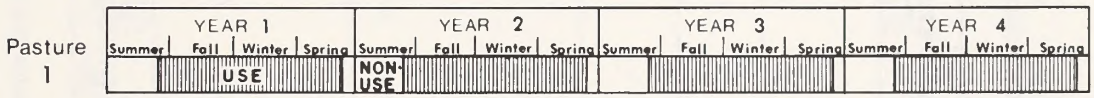
2/ New Mexico Department of Game and Fish Flight Data.



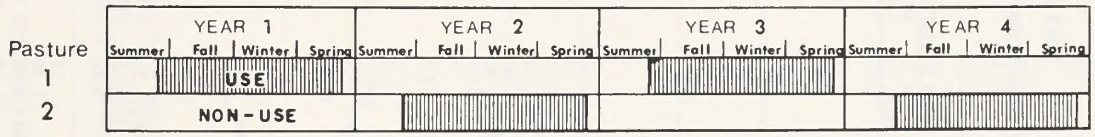

4-Pasture Scheduled Rest-Best Pasture Grazing System



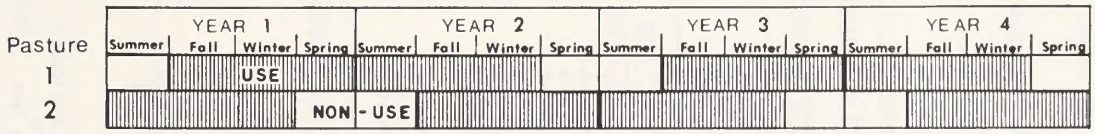

3-Pasture Rest Rotation Grazing System



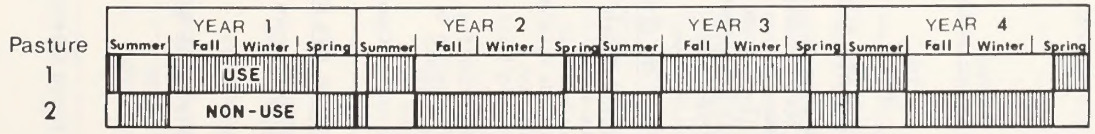

Continuous Seasonal Grazing System




2-Pasture Rotational Seasonal Grazing System




2-Pasture Rotational Deferment Grazing System




2-Pasture Deferred Rotation Grazing System

FIGURE A-6 EXAMPLES OF THE SIX TYPICAL GRAZING SYSTEMS PROPOSED IN THE ENVIRONMENTAL STATEMENT AREA

TABLE A-2

PROPOSED RANGE DEVELOPMENT AND AMP IMPLEMENTATION SCHEDULE



| Allot. No. | Allot. Name | Developments | Units | Acres Disturbed /1 Short Term | Acres Disturbed /1 Long Term | Total Acres Disturbed Short Term | Total Acres Disturbed Long Term | Year of Survey and Design | Year of Construction | Cost | Total Cost /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1. EXISTING AMPs WITHOUT ADJUSTMENTS OR DEVELOPMENTS** | | | | | | | | | | | |
| 036 | Rio Puerco | None Proposed | | | | | | | | | |
| 081 | Lopez Community | None Proposed | | | | | | | | | |
| 261 | Sheep Canyon | None Proposed | | | | | | | | | |
| 279 | Silver Canyon | None Proposed | | | | | | | | | |
| 289 | Jornada Community | None Proposed | | | | | | | | | |
| 300 | Lucero Ind. | None Proposed | | | | | | | | | |
| **II. EXISTING AMP WITH ADJUSTMENTS ONLY - FY80** | | | | | | | | | | | |
| 058 | Canon Alamito | None Proposed | | | | | | | | | |
| 059 | La Jencia | None Proposed | | | | | | | | | |
| 077 | Ladron Peak | None Proposed | | | | | | | | | |
| 091 | Canada Colorado | None Proposed | | | | | | | | | |
| 122 | Abeytas | None Proposed | | | | | | | | | |
| 253 | E. Vigil Ind. | None Proposed | | | | | | | | | |
| 256 | Llano | None Proposed | | | | | | | | | |
| 287 | Gabaldon Ind. | None Proposed | | | | | | | | | |
| 297 | Puertecito del Lemitar | None Proposed | | | | | | | | | |
| 317 | San Pedro | None Proposed | | | | | | | | | |
| 318 | Pueblito Community | None Proposed | | | | | | | | | |
| **III. EXISTING AMPS WITH ADJUSTMENT AND DEVELOPMENTS - FY80** | | | | | | | | | | | |
| 065 | Arroyo Lucero | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,715 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 1,575 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | 3.20 | 2.70 | 79 | 80 | 460 | 28,300 |
| 121 | Rio Salado West | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,236 | |
| | | Storage Tank | 1/2,000 gal. ea. | .20 | .10 | | | | | 975 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 750 | |
| | | Fence | 3.9 mi. | 3.90 | .78 | 7.10 | 3.48 | 79 | 80 | 11,802 | 39,313 |
| 129 | Arroyo Colorado | Spring Development | 1 ea. | .20 | .05 | | | | | 2,100 | |
| | | Pipeline | 9.6 mi. | 14.40 | .96 | | | | | 38,911 | |
| | | Storage Tank | 6/5,000 gal. ea. | 1.20 | .60 | | | | | 9,450 | |
| | | Troughs | 9 ea. | 22.50 | 22.50 | | | | | 4,140 | |
| | | Wildlife Water | 5 ea. | .10 | .25 | 38.40 | 24.36 | 79 | 80 | 3,375 | 57,976 |

TABLE A-2 (continued)

PROPOSED RANGE DEVELOPMENT AND AMP IMPLEMENTATION SCHEDULE



| Allot. No. | Allot. Name | Developments | Units | Acres Disturbed /1 Short Term | Acres Disturbed /1 Long Term | Total Acres Disturbed Short Term | Total Acres Disturbed Long Term | Year of Survey and Design | Year of Construction | Cost | Total Cost /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 254 | Bordo Atravesado | Fence | 1.2 mi. | 1.20 | .24 | 1.20 | .24 | 79 | 80 | 3,200 | 3,200 |
| 255 | Bosquecito | Fence | 4.3 mi. | 4.30 | .86 | 4.30 | .86 | 79 | 80 | 10,979 | 10,979 |
| 283 | Blackington Mountain | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,236 | |
| | | Pipeline | 3.1 mi. | 4.65 | .31 | | | | | 13,471 | |
| | | Storage Tank | 4/5,000 gal. ea. | .80 | .40 | | | | | 6,300 | |
| | | Trough | 4 ea. | 10.00 | 10.00 | | | | | 1,840 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | 16.15 | 10.91 | 79 | 80 | 1,350 | 48,747 |
| 288 | Rio Grande | Storage Tank | 1/2,000 gal. ea. | .20 | .10 | .20 | .10 | 79 | 80 | 1,900 | 1,900 |
| 312 | La Arenosa | Pipeline | 4.7 mi. | 7.05 | .47 | | | | | 22,363 | |
| | | Storage Tank | 2/5,000 gal. ea. | .40 | .20 | | | | | 3,150 | |
| | | Trough | 3 ea. | 7.50 | 7.50 | | | | | 1,380 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 4.4 mi. | 4.40 | .88 | 19.55 | 9.15 | 79 | 80 | 9,490 | 37,733 |
| IV. PROPOSED AMPs WITH ADJUSTMENTS ONLY - FY81 | | | | | | | | | | | |
| 083 | Big Sandy Wash | None Proposed | | | | | | | | | |
| 086 | West Ladron | None Proposed | | | | | | | | | |
| 294 | Nogal Canyon | None Proposed | | | | | | | | | |
| 323 | Water Canyon | None Proposed | | | | | | | | | |
| 360 | Chupadera | None Proposed | | | | | | | | | |
| V. PROPOSED AMPs WITH ADJUSTMENTS AND DEVELOPMENTS - FY81 | | | | | | | | | | | |
| 006 | Ojo Saladito | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,391 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 460 | |
| | | Fence | 3.2 mi. | 3.20 | .64 | | | | | 7,930 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 6.26 | 3.30 | 80 | 81 | 1,250 | 35,581 |
| 016 | Puertecito and Barranco | Pipeline | 1.5 mi. | 2.25 | .15 | | | | | 4,523 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 1,478 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 7.5 mi. | 7.50 | 1.50 | 14.95 | 6.75 | 80 | 81 | 18,670 | 26,021 |
| 258 | Ojo de Amado | Spring Development | 1 ea. | .20 | .05 | | | | | 1,079 | |
| | | Pipeline | 2.3 mi. | 3.45 | .23 | | | | | 7,271 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 2.9 mi. | 2.90 | .58 | 11.75 | 5.96 | 80 | 81 | 8,885 | 19,505 |

TABLE A-2 (continued)

PROPOSED RANGE DEVELOPMENT AND AMP IMPLEMENTATION SCHEDULE



| Allot. No. | Allot. Name | Developments | Units | Acres Disturbed /1 Short Term | Acres Disturbed /1 Long Term | Total Acres Disturbed Short Term | Total Acres Disturbed Long Term | Year of Survey and Design | Year of Construction | Cost | Total Cost /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 263 | Black Mesa | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,236 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 1,575 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 739 | |
| | | Fence | 3.8 mi. | 3.80 | .76 | 7.00 | 3.46 | 80 | 81 | 8,260 | 36,360 |
| 264 | Armijo Community | Spring Development | 1 ea. | .20 | .05 | | | | | 2,039 | |
| | | Pipeline | 1.9 mi. | 2.85 | .19 | | | | | 8,498 | |
| | | Storage Tank | 2/5,000 gal. ea. | .40 | .20 | | | | | 3,150 | |
| | | Trough | 3 ea. | 7.50 | 7.50 | | | | | 1,180 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 8.3 mi. | 8.30 | 1.66 | 19.45 | 9.70 | 80 | 81 | 20,991 | 37,408 |
| 272 | San Pasqual River | Fence | 13.7 mi. | 13.70 | 2.74 | | | | | 29,630 | |
| | | Cattleguard | 3 ea. | .18 | .18 | 13.88 | 2.92 | 80 | 81 | 3,750 | 33,380 |
| 285 | Sand Mountain | Fence | 3 mi. | 3.00 | .60 | 3.00 | .60 | 80 | 81 | 6,255 | 6,255 |
| 290 | Rock Spring Canyon | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,226 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 749 | |
| | | Fence | 2.8 mi. | 2.80 | .56 | | | | | 6,520 | |
| | | Cattleguard | 1 ea. | .06 | .06 | | | | | 2,325 | |
| | | Earthen Reservoir | 3,000 c.y. | 1.00 | .50 | 6.86 | 3.72 | 80 | 81 | 5,060 | 40,430 |
| 293 | Malpais | Fence | 7.3 mi. | 7.30 | 1.46 | 7.30 | 1.46 | 80 | 81 | 15,160 | 15,160 |
| 299 | Pequeno | Fence | 4.5 mi. | 4.50 | .90 | 4.50 | .90 | 80 | 81 | 9,800 | 9,800 |
| 322 | Parida | Spring Development | 1 ea. | .20 | .05 | | | | | 1,000 | |
| | | Pipeline | 4.6 mi. | 6.45 | .46 | | | | | 14,153 | |
| | | Trough | 3 ea. | 7.50 | 7.50 | | | | | 1,380 | |
| | | Wildlife Water | 3 ea. | .30 | .15 | | | | | 2,025 | |
| | | Fence | 3.3 mi. | 3.30 | .66 | | | | | 7,850 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 17.81 | 8.88 | 80 | 81 | 1,250 | 27,658 |
| 328 | Canon Quemado | Fence | 2 mi. | 2.00 | .40 | | | | | 4,383 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 2.06 | .46 | 80 | 81 | 1,250 | 5,633 |
| **VI. PROPOSED AMPs WITH ADJUSTMENTS ONLY - FY82** | | | | | | | | | | | |
| 276 | C. A. Bar | None Proposed | | | | | | | | | |
| 277 | San Jose Canyon | None Proposed | | | | | | | | | |
| 347 | Blue Springs | None Proposed | | | | | | | | | |
| **VII. PROPOSEO AMPs WITH ADJUSTMENTS AND DEVELOPMENTS - FY82** | | | | | | | | | | | |
| 012 | Riley Community | Fence | 1.6 mi. | 1.60 | .32 | | | | | 5,063 | |
| | | Cattleguard | 2 ea. | .12 | .12 | 1.72 | .44 | 81 | 82 | 2,500 | 7,563 |

TABLE A-2 (continued)

PROPOSED RANGE DEVELOPMENT AND AMP IMPLEMENTATION SCHEDULE



| Allot. No. | Allot. Name | Developments | Units | Acres Disturbed /1 Short Term | Acres Disturbed /1 Long Term | Total Acres Disturbed Short Term | Total Acres Disturbed Long Term | Year of Survey and Design | Year of Construction | Cost | Total Cost /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 114 | Cerro del Oro | Well | 2 ea. | 1.00 | .20 | | | | | 31,100 | |
| | | Well Facility | 2 ea. | | | | | | | 20,472 | |
| | | Storage Tank | 2/5,000 gal. ea. | .40 | .20 | | | | | 3,150 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 1,489 | |
| | | Fence | 9 mi. | 9.00 | 1.80 | | | | | 21,470 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 15.46 | 7.26 | 81 | 82 | 1,650 | 79,331 |
| 152 | Cerro Verde | Well | 1 ea. | .50 | .10 | | | | | 15,650 | |
| | | Well Facility | 1 ea. | | | | | | | 10,236 | |
| | | Pipeline | 7.3 mi. | 10.95 | .73 | | | | | 29,014 | |
| | | Storage Tank | 3/5,000 gal. ea. | .60 | .30 | | | | | 4,725 | |
| | | Trough | 4 ea. | 10.00 | 10.00 | | | | | 1,840 | |
| | | Wildlife Water | 3 ea. | .30 | .15 | | | | | 2,025 | |
| | | Fence | 2.8 mi. | 2.80 | .56 | 25.15 | 11.84 | 81 | 82 | 6,896 | 70,386 |
| 251 | Harless | Pipeline | 1.3 mi. | 1.95 | .13 | | | | | 3,712 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 460 | |
| | | Fence | 7.2 mi. | 7.20 | 1.44 | 11.65 | 4.07 | 81 | 82 | 14,600 | 18,772 |
| 252 | Fernandez-Maestas | Fence | 14.7 mi. | 14.70 | 2.94 | | | | | 34,605 | |
| | | Cattleguard | 5 ea. | .30 | .30 | 15.00 | 3.24 | 81 | 82 | 6,250 | 40,855 |
| 262 | Las Canas | Well | 2 ea. | 1.00 | .20 | | | | | 31,200 | |
| | | Well Facility | 2 ea. | | | | | | | 20,572 | |
| | | Storage Tank | 2/5,000 gal. ea. | .40 | .20 | | | | | 3,150 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 1,478 | |
| | | Fence | 2.8 mi. | 2.80 | .56 | | | | | 7,120 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 9.26 | 6.02 | 81 | 82 | 1,250 | 64,770 |
| 266 | Coyote Spring | Pipeline | 5 mi. | 7.50 | .50 | | | | | 17,305 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 1,575 | |
| | | Trough | 3 ea. | 7.50 | 7.50 | | | | | 1,380 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 11 mi. | 11.00 | 2.20 | 25.40 | 10.40 | 81 | 82 | 28,250 | 49,860 |
| 271 | Mesa Redonda | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 10,878 | |
| | | Pipeline | 4.25 mi. | 6.38 | .43 | | | | | 17,965 | |
| | | Storage Tank | 3/5,000 gal. ea. | .60 | .30 | | | | | 4,725 | |
| | | Trough | 4 ea. | 10.00 | 10.00 | | | | | 1,840 | |
| | | Wildlife Water | 3 ea. | .30 | .15 | | | | | 2,025 | |
| | | Fence | 4 mi. | 4.00 | .80 | 21.78 | 11.78 | 81 | 82 | 10,505 | 63,488 |
| 291 | Prairie Spring | Pipeline | 5.8 mi. | 8.70 | .58 | | | | | 14,478 | |
| | | Trough | 4 ea. | 10.00 | 10.00 | | | | | 1,840 | |
| | | Wildlife Water | 3 ea. | .30 | .15 | | | | | 2,025 | |
| | | Fence | 2 mi. | 2.00 | .40 | 21.00 | 11.13 | 81 | 82 | 4,220 | 22,563 |
| 303 | Carthage | Fence | 1.5 mi. | 1.50 | .30 | 1.50 | .30 | 81 | 82 | 3,230 | 3,230 |

TABLE A-2 (continued)

PROPOSED RANGE DEVELOPMENT AND AMP IMPLEMENTATION SCHEDULE



| Allot. No. | Allot. Name | Developments | Units | Acres Disturbed /1 Short Term | Acres Disturbed /1 Long Term | Total Acres Disturbed Short Term | Total Acres Disturbed Long Term | Year of Survey and Design | Year of Construction | Cost | Total Cost/2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 330 | East Williams | Pipeline | 1 mi. | 1.50 | .10 | | | | | 3,016 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 1,575 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 460 | |
| | | Fence | 2.8 mi. | 2.80 | .56 | | | | | 6,295 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 7.06 | 3.32 | 81 | 82 | 1,250 | 12,596 |
| 348 | Cerro Montoso | Fence | 2.2 mi. | 2.20 | .44 | 2.20 | .44 | 81 | 82 | 6,250 | 12,596 |
| 349 | Indian Peak | Fence | 1 mi. | 1.00 | .20 | 1.00 | .20 | 81 | 82 | 2,400 | 2,400 |
| VIII. PROPOSED AMPs WITH ADJUSTMENTS ONLY - FY83 | | | | | | | | | | | |
| 052 | Cerro Colorado | None Proposed | | | | | | | | | |
| 089 | Tsidu-Weza | None Proposed | | | | | | | | | |
| 090 | Petoch Wash | None Proposed | | | | | | | | | |
| 295 | Antelope Well | None Proposed | | | | | | | | | |
| 315 | Polvadera Community | None Proposed | | | | | | | | | |
| 321 | Puertecito Gap | None Proposed | | | | | | | | | |
| IX. PROPOSED AMPs WITH ADJUSTMENTS AND DEVELOPMENTS - FY83 | | | | | | | | | | | |
| 002 | Mesa Carrizo | Pipeline | 3.3 mi. | 4.95 | .33 | | | | | 11,214 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 1,350 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | 10.35 | 5.53 | 82 | 83 | 1,575 | 15,059 |
| 037 | Chavez Community | Fence | 3.8 mi. | 3.80 | .76 | 3.80 | .76 | 82 | 83 | 8,450 | 8,450 |
| 131 | Los Valles | Fence | 1.5 mi. | 1.50 | .30 | 1.50 | .30 | 82 | 83 | 3,875 | 3,875 |
| 250 | Milligan Gulch | Pipeline | 4 mi. | 6.00 | .40 | | | | | 13,034 | |
| | | Storage Tank | 2/5,000 gal ea. | .40 | .20 | | | | | 3,150 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 7.4 mi. | 7.40 | 1.48 | 19.00 | 7.18 | 82 | 83 | 16,155 | 34,609 |
| 260 | Sierra Larga | Well | 1 ea. | .50 | .10 | | | | | 15,550 | |
| | | Well Facility | 1 ea. | | | | | | | 9,880 | |
| | | Pipeline | 1.25 mi. | 1.88 | .13 | | | | | 5,016 | |
| | | Storage Tank | 4/5,000 gal. ea. | .80 | .40 | | | | | 6,300 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 1 ea. | .10 | .05 | | | | | 675 | |
| | | Fence | 3.8 mi. | 3.80 | .76 | 12.08 | 6.44 | 82 | 83 | 8,395 | 46,736 |
| 268 | Torreon | Well | 1 ea. | .50 | .10 | | | | | 6,975 | |
| | | Well Facility | 1 ea. | | | | | | | 8,528 | |
| | | Pipeline | 10.5 mi. | 15.75 | 1.05 | | | | | 34,372 | |
| | | Storage Tank | 1/5,000 ga. ea. | .20 | .10 | | | | | 3,150 | |
| | | Trough | 9 ea. | 22.50 | 22.50 | | | | | 4,140 | |
| | | Wildlife Water | 3 ea. | .30 | .15 | | | | | 2,025 | |
| | | Fence | 16.2 mi. | 16.20 | 3.24 | | | | | 39,604 | |
| | | Cattleguard | 2 ea. | .12 | .12 | 55.57 | 27.26 | 82 | 83 | 2,500 | 101,294 |

TABLE A-2 (continued)

PROPOSED RANGE DEVELOPMENT AND AMP IMPLEMENTATION SCHEDULE



| Allot. No. | Allot. Name | Developments | Units | Acres Disturbed /1 Short Term | Acres Disturbed /1 Long Term | Total Acres Disturbed Short Term | Total Acres Disturbed Long Term | Year of Survey and Design | Year of Construction | Cost | Total Cost /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 275 | Adobe, Hansenburg, Padilla | Fence | 5 mi. | 5.00 | 1.00 | 5.00 | 1.00 | 82 | 83 | 10,420 | 10,420 |
| 280 | Tecolote Draw | Pipeline | 1.6 mi. | 2.40 | .16 | | | | | 4,653 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 460 | |
| | | Wildlife Water | 1 ea. | .10 | .05 | | | | | 675 | |
| | | Fence | 11.3 mi. | 11.30 | 2.26 | 16.30 | 4.97 | 82 | 83 | 27,699 | 33,487 |
| 284 | Mesa Canyon Well | Pipeline | 1.9 mi. | 2.85 | .19 | | | | | 6,048 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 3,150 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 4.5 mi. | 4.50 | .90 | | | | | 9,975 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 12.81 | 6.35 | 82 | 83 | 1,250 | 22,693 |
| 298 | Belcher-Corn | Pipeline | 1.2 mi. | 1.80 | .12 | | | | | 3,790 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 460 | |
| | | Wildlife Water | 1 ea. | .10 | .05 | | | | | 675 | |
| | | Fence | 2.6 mi. | 2.60 | .52 | 7.00 | 3.19 | 82 | 83 | 5,355 | 10,280 |
| 301 | Bennett-Wilson | Pipeline | 3.2 mi. | 4.80 | .32 | | | | | 7,783 | |
| | | Storage Tank | 1/5,000 gal. ea. | .20 | .10 | | | | | 3,150 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 1 ea. | .10 | .05 | | | | | 675 | |
| | | Fence | 3 mi. | 3.00 | .60 | 13.10 | 6.07 | 82 | 83 | 6,360 | 18,888 |
| 306 | Veranito | Pipeline | 3.9 mi. | 5.85 | .39 | | | | | 10,239 | |
| | | Trough | 3 ea. | 7.50 | 7.50 | | | | | 1,380 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 3.3 mi. | 3.30 | .66 | 16.85 | 8.65 | 82 | 83 | 7,868 | 20,837 |
| 308 | Padilla Community | Fence | 3.5 mi. | 3.50 | .70 | 3.50 | .70 | 82 | 83 | 7,320 | 7,320 |
| 325 | West Williams | Pipeline | 3 mi. | 4.50 | .30 | | | | | 8,501 | |
| | | Storage Tank | 2/5,000 gal. ea. | .40 | .20 | | | | | 3,150 | |
| | | Trough | 2 ea. | 5.00 | 5.00 | | | | | 920 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 7.5 mi. | 7.50 | 1.50 | | | | | 15,645 | |
| | | Cattleguard | 2 ea. | .12 | .12 | 17.72 | 7.22 | 82 | 83 | 2,500 | 32,066 |
| 327 | Cedar Pass | Pipeline | 2.5 mi. | 3.75 | .25 | | | | | 6,987 | |
| | | Trough | 1 ea. | 2.50 | 2.50 | | | | | 460 | |
| | | Wildlife Water | 2 ea. | .20 | .10 | | | | | 1,350 | |
| | | Fence | 2.1 mi. | 2.10 | .42 | | | | | 4,528 | |
| | | Cattleguard | 1 ea. | .06 | .06 | 8.61 | 3.33 | 82 | 83 | 1,250 | 14,575 |

/1 Disturbance listed for fences - includes that for the associated roads,
Disturbance listed for troughs - includes that for sacrifice areas.
/2 Estimated 1977 Dollars

Source: Proposed AMPs, Socorro District

TABLE A-3

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.I | Wildlife | | | |
| | 2.1 | | | |
| Develop AMPs on 25 allotments in the Ladron Planning Unit. | Install and fence ground level waters where needed unit wide when new water pipelines are constructed. | Fencing of wildlife waters would inconvenience livestock operators by requiring maintenance or draining of storage tanks due to malfunctions. | Approve wildlife recommendation. | Possible temporary loss of waters in certain pastures due to malfunction of wildlife water. |
| | 2.2 | | | |
| | Implement grazing management systems on specific allotments to improve wildlife habitat. | An anticipated 20 percent livestock reduction would be necessary to improve wildlife habitat. | Develop objectives for wildlife habitat improvement for each allotment through the AMP process. Allocate vegetation for wildlife based on a range vegetation survey. | Food and cover for wildlife would be adjusted up or down based on Range Survey and AMP Process. It is anticipated some livestock reductions would occur to improve wildlife habitat. |
| | 2.3 | | | |
| | Partially fence selected reservoirs on public land in areas that would be of greatest benefit to wildlife habitat improvement. | Livestock could become trapped in fenced areas if not properly maintained. | Accept wildlife recommendation. | Negligible livestock losses would occur if fenced areas were not maintained. Livestock could become trapped in these fenced areas. |
| | 2.5 | | | |
| | Install three antelope type panels in the net wire fence located in T. 3N., R. 1W., Sections 20, 29, 30 if the population of antelope expands into the area. | The livestock operator would experience some inconvenience in his calf weaning operation. | Accept wildlife recommendation. | Accept negligible inconvenience to livestock operator during his calf weaning operation. This would not have any economic affect on the operator. |
| | 3.1 | | | |
| | Prohibit implementation of any development projects or surface disturbing activities on the Ladron Mountain Area pending completion of a faunal survey. | AMPs with proposed projects on 6 allotments within the Ladron Mountain Area cannot be implemented. AMPs and associated projects are subject to change pending completion of Ladron Mountain faunal survey. | Complete faunal survey of Ladron Mountain Area and restrict all surface disturbance as much as possible pending survey completion. | No significant resource losses would occur from delaying AMP implementation until after July 1978. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | 4.2 | | | |
| Develop AMPs on 25 allotments in the Ladron Planning Unit. | Acquire the Arroyo Salado (HA-2) Riparian Habitat Area and manage for the benefit of wildlife species. T. 5N., R. 3W., Section 2:N½ T. 6N., R. 3W., Section 35:S½ | To manage for riparian habitat a portion of the 640 acre Arroyo Salado Habitat Area would require fencing, thereby eliminating a certain amount of existing livestock use. | Accept wildlife recommendation. | Livestock use on the Mesa Carrizo Allotment would be reduced by 7 AUMs. |
| | 4.3 | | | |
| | Acquire Laguna Bonita (HA-3) Riparian Habitat Area and manage for the benefit of wildlife species. T. 6N., R. 5W., Section 28:S½NW¼ | Acquiring the riparian habitat would adversely affect the livestock operator economically since it is also a base water. | Develop an agreement to acquire an easement to fence a portion of Laguna Bonita and manage habitat for benefit of wildlife species. | Five to ten acres of riparian habitat encompassing the base water would accommodate livestock use. The remaining 150 acres of riparian habitat would be unavailable to livestock. The Mesa Del Oro Allotment would be reduced by 17 AUMs. |
| | 4.4 | | | |
| | Acquire the Ponia Creek Riparian Habitat Area and manage for the benefit of wildlife species. T. 7N., R. 4W., Section 7:All; Section 18:NW¼, N½SW¼, SW¼SW¼; Section 19:All | Continued grazing use on 1,560 acres of this riparian habitat would adversely affect the wildlife species present. | Develop an agreement with the landowners to acquire the land in Ponia Creek by exchange and manage it as riparian habitat for benefit of wildlife. | Livestock use on the Arroyo Lucero Allotment would be reduced by 18 AUMs. |
| | Recreation | | | |
| | 1.1 | | | |
| | Beginning in FY 77, manage the Class II Visual Resource Areas of the planning unit according to Class II Standards. | Intensive grazing use on approximately 3,000 acres of Class II Visual Resources could increase erosion, thereby increasing degradation of the visual resources through soil exposure and vegetative loss. | Accept Recreation Recommendation 1.1. | Livestock use affecting approximately 3,000 acres would have to be adjusted through design and implementation of AMPs. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Recreation (continued) 1.2 | | | |
| Develop AMPs on 25 allotments in the Ladron Planning Unit. | Beginning in FY 77, manage the Class III Visual Resource Areas in the planning unit according to Class III Standards. | Intensive grazing use on approximately 45,000 acres of Class III Visual Resources could contribute to degradation of the visual resource by increasing soil erosion through vegetative removal, trampling, and project installation. | Accept Recreation Recommendation 1.2. | Livestock use affecting approximately 45,000 acres would have to be adjusted through design and implementation of AMPs. |
| | 1.3 | | | |
| | Beginning in FY 77, manage the Class IV Visual Resource Areas in accordance with Class IV Standards. | Intensive grazing use on approximately 35,000 acres of Class IV Visual Resources with moderate to severe erosion could increase erosion through removal of vegetation, livestock trampling, and range development installation. | Accept Recreation Recommendation 1.3 | Livestock use affecting approximately 35,000 acres would have to be adjusted through AMP design and implementation. |
| | 3.1 | | | |
| | Study Ladron Mountain as a potential Wilderness Area by FY 80. Manage the area as a de-facto wilderness until study is completed. | Intensive livestock grazing would aggravate erosion on approximately 3,200 acres of the study area. Range developments would detract from the wilderness character. | Accept Recreation Recommendation 3.1. | Livestock use on 3,200 acres of moderate erosion class lands would have to be adjusted through the design and implementation of AMPs. Any range developments associated with AMPs affecting the 18,000 acre study area would be delayed or eliminated pending the completion of the wilderness study in FY 80. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Recreation (continued)<br>6.1 | | | |
| Develop AMPs on 25 allotments in the Ladron Planning Unit. | Designate all public lands in the planning unit as open to off-road vehicle use. | Disturbance of livestock and destruction of vegetation could occur on areas experiencing ORV use. Intensive grazing could be disrupted by ORV use on rangelands. | Restrict ORV use to existing roads and trails. | An undetermined amount of visitor days attributed to ORV use could be lost. Recreation ORV use in the planning unit is low. Ranchers would be restricted in their ORV travel. This would be more of an inconvenience than a hardship. |
| | Watershed<br>1.1 | | | |
| | Reduce soil surface factors an average of 10-15 points on all allotments suitable for intensive management by development and implementation of AMPs. | Development and implementation of AMPs would create some economic stress on ranchers due to initial adjustments of livestock required to protect watershed values. | Accept watershed recommendation. | Grazing systems and numbers of livestock on 25 allotments would be adjusted by design and implementation of AMPs. |
| | 1.2 | | | |
| | Allocate sufficient vegetative production through grazing management to increase average ground cover on each watershed area. | Livestock grazing on some areas may need to be removed or reduced to attain the desired level of cover. | Accept watershed recommendation. | Livestock numbers and grazing systems would require adjustment through AMP implementation. |
| | 3.1 | | | |
| | Provide watershed protection on the unit by prohibiting the construction of new roads and trails. | Proper management of intensive livestock grazing may require the construction of new roads and trails. | Construct roads on an "as needed basis" for the management of all resources. | Some watershed values may be lost in the construction of new roads and trails supporting the implementation of grazing systems. However, more watershed protection would result from the implementation of AMPs. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP I | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Minerals 2.2 | | | |
| Develop AMPs on 25 allotments in the Ladron Planning Unit. | Plan for the orderly development of the coal resources in the Datil Mountain Coal Field. | Coal development on two allotments affecting approximately 7,000 acres would destroy livestock forage and disrupt livestock management. | If the Datil Coal Field is nominated for leasing, an EAR would be completed to consider all resource values. | Possible loss of livestock AUMs if the 7,000-acre area is leased and developed for coal. |
| | 2.3 | | | |
| | Plan for the orderly development of the geothermal resources within the planning unit by FY 83. | Numbers of livestock grazing on 16 allotments affecting approximately 163,000 acres could be subject to a downward adjustment. Structures, roads and production associated with geothermal development could cause disruption of livestock management. | Prepare environmental assessments for geothermal actions on a case or area basis as needed. | Leasing or developing geothermal resources would be delayed until an environmental assessment has been completed. Some form of livestock and/or grazing system adjustment would be required on areas approved for leasing and developing. |
| | Lands 1.1 | | | |
| | Establish utility corridors along existing powerline and pipeline rights-of-way in the eastern portion of the planning unit by FY 79. | Livestock use on approximately 5,000 acres would be limited or eliminated by construction of utilities and associated roads. | Accept lands recommendation. | Livestock use would be adjusted through the development of AMPs on 3 allotments in order to accommodate a utility corridor. |
| RM-1.3 | | | | |
| Manage six allotments as non-AMP areas in the Ladron Planning Unit. | There are no apparent conflicts with other resources. | None | Accept range Recommendation RM-1.3. | The grazing capacity on six non-AMP allotments would be adjusted to protect and enhance other resource values on public lands. Past experience indicates that livestock numbers on scattered public lands in non-AMP areas scheduled for reduction, would remain the same. Livestock operators are not motivated to accept proposed reductions where public lands make up a small percentage of the non-AMP allotment. For all practical purposes the reductions are unenforceable and the operator usually does not adjust livestock numbers. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Wildlife 1.2 | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | Determine the optimum amount of water that is needed in Elephant Butte Marsh for rookery nesting species and for nesting of the Mexican Duck. | Intensive livestock grazing would be eliminated on approximately 300-800 acres pending the findings of an optimum habitat study. This would affect 1 allotment and involve an economic loss to the rancher. | Accept wildlife recommendation. Develop the plan with Bureau of Reclamation to insure water is available. | Grazing would be eliminated on approximately 600 acres of Bosque lands. Livestock use on the allotment would be reduced 972 AUMs to provide for wildlife habitat. |
| | 1.4 | | | |
| | Develop a grazing system within the next two years that would exclude livestock grazing from the period of April 1 through July 31 of each year in Elephant Butte Marsh. | Intensive livestock grazing totaling 84 AUMs would be eliminated on 600 acres of Elephant Butte Marsh. The allottees would be experiencing some degree of economic adversity. | Develop a grazing system in cooperation with the allottee by 1978 that is compatible with wildlife and livestock management. | Forage allocation for livestock and wildlife on the Elephant Butte Marsh Area would be cooperatively determined through development of an AMP. |
| | 2.1 | | | |
| | Develop a cooperative agreement with the Bureau of Reclamation to manage wildlife habitat on 18,700 acres of Reclamation lands. | Intensive livestock management may have to be adjusted to reflect wildlife values. | Seek an understanding with the Bureau of Reclamation to determine the extent the existing livestock agreement applies to wildlife. | Adjustments in forage allocation to livestock would be accomplished through AMPs on 4 allotments if the cooperative agreement on wildlife management can be reached. |
| | 2.2 | | | |
| | Improve interspersion of habitat for all species in the Bosque Area by burning selected small areas of salt cedar. | Intensive livestock management may have to be adjusted to accommodate this wildlife habitat improvement. | Seek an understanding with the Bureau of Reclamation to determine the extent the existing livestock agreement applies to wildlife. | Adjustments in forage allocation to livestock would be accomplished through AMPs on 4 allotments if the cooperative agreement on wildlife management can be reached. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Wildlife (continued) | | | |
| | 3.2 | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | Partially fence off all reservoirs that are on public lands. | Livestock use of the reservoirs may conflict with partial fencing of reservoirs by becoming trapped. Possible livestock may be lost. | Partially fence selected reservoirs in areas that would be of greatest benefit to wildlife habitat improvement. | Livestock operators may suffer slight economic loss or inconvenience in management if livestock become entrapped in partially fenced reservoirs. |
| | 3.4 | | | |
| | Identify, develop and fence springs and seeps that are suitable primarily for wildlife. | Livestock numbers and grazing may be adjusted to reflect a loss of use of these waters. | Develop springs for the benefit of both wildlife and livestock only in areas classified as being in moderate or better erosion condition. | By developing springs that would also accommodate livestock use, wildlife habitat and use would be diminished. |
| | 3.7 | | | |
| | Implement grazing management systems on specific allotments to improve wildlife habitat by providing food and cover for wildlife species. | Wildlife species may be adversely affected by severe competition resulting from intensive livestock grazing. | Develop objectives for wildlife habitat improvement for each allotment through the AMP process. | Intensive livestock grazing may require adjustments in use and numbers to accommodate wildlife values on allotments. |
| | 4.1 | | | |
| | Alter net wire fence with ten 100-foot panels or other means which would insure free movement by antelope. | Intensive livestock grazing systems may be hindered by livestock passing through antelope panels. Increase antelope movement to previously unavailable habitat may result in increased competition between antelope and livestock. | Install antelope panels or passes wherever necessary to facilitate the free movement of antelope. | Livestock operator may suffer some inconvenience by livestock moving into wrong pastures, particularly during weaning. Livestock numbers and use may be adjusted through an AMP to manage for increased wildlife values. |
| | 7.2 | | | |
| | Provide protection to the oak species in the Nogal Canyon Area primarily for the benefit of the band tailed pigeon. | Intensive livestock grazing may be somewhat disrupted by increased recreation use resulting from increased wildlife populations. | Provide for protection of oak species in the Nogal Canyon South Area through the development of an AMP or by intensive custodial management. | Livestock adjustments may be required through the AMP process in order to protect oak species and enhance the band tailed pigeon. Inconveniences to livestock operation such as open gates or unauthorized ORV use may have to be tolerated to a degree. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Wildlife (continued) 8.1 | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | Increase the density of key browse species such as mountain mahogany, four-wing saltbush, Mormon tea and apache plume on all allotments within the pinyon-juniper vegetative type. | Managing browse species for the benefit of wildlife could conflict with intensive management of available forage for the benefit of livestock. | Increase density and improve vigor of key browse species within the pinyon-juniper vegetative type through improved livestock management practices. | To ensure adequate browse for wildlife, livestock grazing systems and numbers may require adjustments through development and implementation of an AMP. |
| | Recreation 2.1 | | | |
| | Manage Nogal Canyon South as a Class III visual resource in accordance with BLM Manual 6310.18. | Developments associated with intensive livestock grazing may be eliminated or restricted in the Class III Visual Resource Area, thereby affecting grazing use of the area. | Reject recreation recommendation R2.1. Maintain present management until if at all possible, private lands are acquired. Classify as a Class II Visual Resource only if private lands are acquired. | Under existing management, the quality of the visual resources in Nogal Canyon South may deteriorate below the standards required for designation. |
| | 4.1, 4.2, 4.3 Combined | | | |
| | Initiate a program to help maintain a litter free aesthetic environment at Amado Springs (4.1) by closing the access road to all forms of traffic (4.2) and managing as a Class III Visual Resource (4.3). | The livestock operator may be inconvenienced in his management operations by the road closure, and by possible restrictions on range developments to meet Visual Resource Class III standards. | Accept combined recommendations. | Livestock operator may experience some inconvenience in managing his operation. His management may require some minor adjustment to accommodate the visual resource objectives of the area. |
| | 5.1, 5.2, 5.3 Combined | | | |
| | Close the Soaptree Yucca Area to off-road vehicle use and vegetative sales (5.1). Restrict grazing use in the delineated Soaptree Yucca Area from June 15-September 1 (5.2). Manage the Soaptree Yucca Area as a Class III Visual Resource (5.3). | Intensive livestock grazing in the Soaptree Yucca Area would be restricted on a seasonal basis. Livestock adjustment may be required to ensure the aesthetics of a Class III Visual Resource. Restriction of ORV travel may inconvenience the livestock operator during his management of grazing. | Accept combined recommendations. | Grazing systems and livestock numbers may be adjusted to accommodate the botanical values of the 3,200-acre yucca area. Livestock operators may be inconvenienced by the ORV restriction and increased recreation use. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Recreation (continued) 7.1, 7.2, 7.3 Combined | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | Secure a cooperative agreement with the Bureau of Reclamation to give BLM total management control of 2,000 acres of land and water resources in the Elephant Butte Marsh Area (7.1). Designate Elephant Butte Marsh as a Research Natural Area (7.2). Manage Elephant Butte Marsh as a Class II Visual Resource (7.3). | Intensive livestock grazing on 1 allotment in the Bosque would be adversely affected. Total management control of 2,000 acres, designation as a research area and management as a Class II Visual Resource, may result in economic losses due to possible livestock reductions. Grazing management may be altered or impeded by increased visitor use for recreation. | Reject recreation recommendation R-7.1, 7.2 and 7.3. | Intensive livestock grazing may be adjusted to protect aesthetic and wildlife value not adequately considered under existing cooperative agreements. Lack of designation and management for wildlife and aesthetic values may result in loss of valuable wildlife and an undetermined amount of recreation visitor use. |
| | 8.1 | | | |
| | Designate 606,000 acres of the Stallion Planning Unit as open to ORV use unless otherwise closed. | Allotments where ORV use occurs may experience disruption to livestock grazing, vandalism to developments, and loss of vegetation. | Restrict off-road vehicle use to existing roads and trails. | Less than 1,000 visitor days of ORV recreation opportunities would be eliminated. Livestock operators may experience some inconvenience in restricting their use of vehicles. Enforcement of this policy may put a heavy burden on District personnel. |
| | 10.1 | | | |
| | Manage the Nogal Canyon North Area as a Class III Visual Resource. | Range developments accompanying intensive grazing may cause intrusions on visual resources. | Accept recreation recommendation R-10. | Intensive livestock grazing may require adjustment through development of an AMP to be compatible with Class III Visual Resources. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-I.1 | Recreation (continued)<br>13.1, 13.2, 13.3, 14.1 Combined | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | Study the Cerro Montoso Site for scientific research and stabilization needs (R-13.1). Study the waterfall petroglyphs for preservation and protection (R-13.2). Analyze the stabilization needs of the Fernandez Site and implement any resulting program (R-13.3). Stabilize and interpret AR-30-02-205, a historic Pueblo. | Fencing these cultural sites for protection would eliminate intensive livestock grazing from approximately 20 acres on 3 separate allotments. | Accept recreation recommendations R-13.1, R-13.2, R-13.3, and R-14.1. | Protection of 3 cultural resource sites covering approximately 20 acres would require fencing, thereby eliminating grazing from the areas. |
| | 15.I, 15.2, 15.3 Combined | | | |
| | Beginning in FY 78, manage the Class II Visual Resource Areas of the planning unit in accordance with Class II Standards (15.1). Beginning in FY 78 manage the Class III Visual Resource Areas in the planning unit in accordance with Class III Standards (15.2). Beginning in FY 78, manage the Class IV Visual Resource Areas of the planning unit according to Class IV Standards. | Intensive grazing use on visual resource having an SSF of 50 or greater may contribute to degradation of the visual resource by exacerbating soil erosion through vegetative removal, trampling, and range development installation. The approximate acres affected are:<br>Class II - 300 acres<br>Class III - 60,000 acres<br>Class IV - 240,000 acres | Accept recreation recommendations 15.1, 15.2, and 15.3. | Intensive livestock use and management, affecting approximately 300,000 acres of land with an SSF of 50 or greater, would require adjustment through development of an AMP. |
| | Watershed<br>1.1, 1.2, 1.3 Combined | | | |
| | 1.1 Reduce soil surface factors (SSF) an average of 10-15 points on all allotments (61) suitable for intensive management by development and implementation of AMPs.<br>1.2 Reduce SSFs 10-15 points on custodial management allotments by intensifying livestock use, supervision and adjusting stocking rates where necessary. | Management for watershed values may require reduction in livestock use and numbers. Range developments could be eliminated or restricted in some areas of critical erosion. | Accept watershed recommendation 1.1. | Livestock use and numbers may require adjustment through development of AMPs. Livestock operators may experience a degree of economic loss. Watershed values would improve. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Watershed (continued) | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | 1.3 Allocate sufficient vegetative production (live vegetation and litter) to increase average ground cover on each watershed area as identified. | | | |
| | 3.1 | | | |
| | Provide watershed protection on the unit by prohibiting the construction of new roads and trails. | Eliminating or restricting construction of new roads and trails may adversely limit intensive livestock grazing on certain allotments, which require these developments for effective grazing management. | Construct roads only on an as needed basis for the development and management of all resources. The impacts of the proposed construction would be analyzed. | Intensive livestock grazing would benefit by the construction of necessary roads. The visual, soil, and watershed resources would be adversely affected by road construction. Road construction in support of better grazing systems could, in the long term, result in overall improvement to all the resources which would outweigh the minor adverse impacts. |
| | 4.1 | | | |
| | Designate 606,000 acres of the Stallion Planning Unit as open to ORV use unless otherwise closed. | Allotments where ORV use occurs may experience disruption to livestock grazing, vandalism to developments, and loss of vegetation. | Restrict off-road vehicle use to existing roads and trails. | Less than 1,000 visitor days of Orv recreation opportunities would be eliminated. Livestock operators may experience some inconvenience in restricting their use of vehicles. Enforcement of this policy may put a heavy burden on District personnel. |
| | Forestry | | | |
| | 1.1 | | | |
| | Prohibit all off-road vehicle use in the pinyon-juniper areas that have a moderate or higher erosion classification. | Livestock management that requires off-road travel may be restricted. This would be an inconvenience to ranchers and possibly cause an economic loss. | Close to off-road vehicle use all pinyon-juniper areas with a moderate or higher erosion classification. Adding special use requests would be considered and authorized on the closed areas on a case by case basis. | Wildlife, watershed, and aesthetics of pinyon-juniper areas may be adversely affected by allowance of ORV for livestock management purposes. Livestock operators may receive special permission for ORV travel to enhance their livestock management and reduce the possibilities of economic losses from an ORV restriction. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Forestry (continued) 1.2 | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | First priority in AMP preparation should be developing and/or revising AMPs on all allotments within pinyon-juniper areas having a moderate or higher erosion classification. | Management for forestry values in moderate to high pinyon-juniper erosion areas may require reductions in livestock use and numbers. Some livestock operators would experience economic losses. | Prepare AMPs on priority basis as outlined in RM 1.1 and 1.2. | Reductions in livestock use and numbers would not necessarily occur in pinyon-juniper areas due to other priorities. Watershed, wildlife, soils, and aesthetic values of some watershed areas would continue to deteriorate from non-AMP grazing use. |
| | Minerals | | | |
| | 1.1 | | | |
| | Make available public lands within the planning unit that are suitable for geothermal development by completion of an environmental assessment. | Intensive livestock grazing on 41 allotments affecting 366,572 acres of public land may be subject to adjustments in use and numbers resulting from geothermal leasing actions. Geothermal testing and developments could cause an undetermined amount of surface disturbance during development and occupy certain lands now used for grazing. The livestock operator would be economically affected by any livestock reductions. | Complete environmental analysis on proposed geothermal lease areas to determine if they are suitable for leasing. | Livestock adjustments may be required. |
| | 1.2 | | | |
| | The Jornada Lava Flow in area 2, Rio Grande Trough, would remain open to mineral leasing until there is sufficient data to indicate that minerals are not present in the area. | Open mineral leasing accompanied by exploration and development could create disruptions in livestock management and reduce or eliminate portions of existing grazing areas. | Leave the Jornada Lava Flow open to mineral leasing subject to a minimum of road and trail construction in exploration and development activities. | Leasing, exploration, and development activities on approximately 18,000 acres would continue, thereby benefiting the energy industry. Livestock numbers on 1 allotment may require adjustments. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Minerals (continued) | | | |
| | 1.4 | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | If a private industry study of the Jornada Coal Field shows a minable coal bed, especially one of coking quality, then prepare an environmental assessment which would determine the impacts of such a mining operation, the lands to make available for lease contracts, and the precautionary measures to be implemented. | Livestock use and numbers on 12 allotments may require adjustments due to coal leasing affecting approximately 87,000 acres. | Accept minerals recommendation 1.4. | Leasing exploration and development activities on part or all of 87,000 acres affecting 12 allotments could result in development of coal resources. Livestock operations may require adjustments in grazing systems and numbers to accommodate vegetation disturbed or lost as a result of leasing activities. |
| | 3.1 | | | |
| | Oppose any closures or withdrawals prohibiting mineral entry and subsequent development on public lands and mineral reserves within the planning unit. | Livestock grazing on public lands not yet developed or explored for minerals could be adversely affected by mining activities. Vegetation could be lost due to roads and surface disturbance resulting from mining activities. | Close areas to mineral entry only after environmental assessment indicates that valuable resources would be lost or destroyed. | Mining activities would occur on fewer acres of grazing lands due to the environmental assessments. Grazing systems and uses would be adjusted to accommodate a certain amount of mining activities. |
| | Lands | | | |
| | 2.1 | | | |
| | Efforts should be made to coordinate the location of utility corridors on existing sites between planning units and within other districts. | Establishing utility corridors could result in larger rights-of-way to accommodate more utilities in a corridor. Loss of vegetation from disturbance may require livestock adjustments. Corridors may affect physical fencing of allotments and require additional expenses for modifying existing developments. | Identify and establish utility corridors in the District by the end of FY 78. | Livestock operations could require adjustments in use and number. This could be accomplished through an AMP. |

TABLE A-3 (continued)

PLANNING SYSTEM INTERRELATIONSHIPS



| LIVESTOCK MFP 1 | OTHER RESOURCE STEP 1 MFP CONFLICTS WITH LIVESTOCK MFP RECOMMENDATIONS | MFP STEP 1 CONFLICTS (NARRATIVE) | MFP STEP 3 DECISION | RESOURCE TRADE-OFFS |
|---|---|---|---|---|
| RM-1.1 | Lands (continued) 6.1 | | | |
| Develop AMPs on 63 allotments in the Stallion Planning Unit | Make public lands in the Stallion Planning Unit available to the U. S. Army for use as an Extension Area for missile firing. | Livestock operators would be inconvenienced due to the requirement of evacuation of all civilians from the Extension Area during firing. Possible damage to livestock and range developments may result from missiles. Range fires could be caused by missiles, thereby causing severe economic hardship to the livestock operator. | Consider use of public lands as Extension Areas for missile firings. | Resource values in the Planning Unit would be given consideration before reaching a decision. A smaller extension area would impact fewer resources, including livestock operations. Any decisions on the extension area would be incorporated into the appropriate AMPs. |
| | Range 5.2 | | | |
| | Provide sufficient forage in New Tank, New Well, and Bustos Pastures for the 20-30 head of horses on Allotment 254. | The livestock operator would experience a long term economic loss as permanent livestock reductions are necessary to provide forage for the wild horses. | Reduce livestock AUMs to support a maximum of 30 wild horses. | To support 30 existing horses the livestock operator would be reduced 360 AUMs. |
| RM-2.1 | | | | |
| Manage twenty allotments as non-AMP areas in the Stallion Planning Unit | There are no apparent conflicts with other resources. | None | Accept Range Recommendation. | The grazing capacity on twenty non-AMP allotments would be adjusted to protect and enhance other resource values on public lands. Past experience indicates that livestock numbers on scattered public lands in non-AMP areas scheduled for reduction, would remain the same. Livestock operators are not motivated to accept proposed reductions where public lands make up a small percentage of the non-AMP allotment. For all practical purposes the reductions are unenforceable and the operator usually does not adjust livestock numbers. |

Source: BLM Socorro District Files

# APPENDIX 2

## VEGETATION


| | Page |
|---|---|
| Table A-4 Scientific Name Equivalents for Common Names of Plants Used in the Text and Captions | A-38 |
| Existing Environment | A-40 |
| Range and Soil Survey | A-40 |
| Relationship of Soils to Range Sites | A-40 |
| Table A-5 Physical Characteristics of Four MLRAs | A-40 |
| Correlating Range Survey Data to Soil Survey Data | A-40 |
| Range Condition | A-40 |
| Table A-6 Existing Range Condition of Allotments | A-41 |
| Figure A-7 Comparison of "Range Site Guide" to "Range Type Writeups in Determining Range Condition" | A-43 |
| Range Trend | A-44 |
| Long-Term Predictions | A-44 |
| Range Condition | A-44 |
| Table A-7 Prediction of Range Condition | A-44 |
| Potential Productivity | A-44 |
| Table A-8 Example of How the Weighted Proper Use Factor Was Calculated for the Sandy (SD) Range Site | A-45 |
| Table A-9 Potential Productivities of Range Sites | A-46 |
| Proposed Action | A-47 |
| Assumptions | A-47 |
| Methods | A-47 |
| No Action Alternative | A-48 |
| Assumptions | A-48 |
| Methods | A-48 |
| Vegetative Production | A-48 |
| Livestock Adjustment Alternative | A-48 |
| Assumptions | A-48 |
| Methods | A-49 |
| Vegetative Production | A-49 |
| Density | A-49 |
| Table A-10 Vegetative Production when Livestock Use Is Reduced from Heavy to Moderate | A-50 |
| Table A-11 Vegetative Production when Grazing Systems Are Implemented on Rangelands that Have Previously Been Grazed Continuously with a Moderate or Proper Stocking Rate | A-50 |
| Table A-12 Density and Cover Values when Grazing Is Reduced from Heavy to Moderate Use | A-51 |

VEGETATION (continued)


| | Page |
|---|---|
| Table A-13 Density and Cover Values when Grazing Systems are Implemented on Rangelands that Have Previously Been Grazed Continuously with a Moderate or Proper Stocking Rate | A-51 |
| Pasture Capacity Level Alternative | A-51 |
| Assumptions | A-51 |
| Methods | A-51 |
| Table A-14 Vegetative Production when Livestock Use Was Reduced from Moderate to Light | A-52 |
| Table A-15 Density and Cover Values when Grazing Is Reduced from Moderate to Light Use | A-52 |
| Vegetative Production | A-53 |
| Density | A-53 |
| Enhancement of Sensitive Resource Values Alternative | A-54 |
| Assumptions | A-54 |
| Methods | A-54 |
| Vegetative Production | A-54 |
| Density | A-55 |
| No Grazing Alternative | A-55 |
| Assumptions | A-55 |
| Methods | A-55 |
| Vegetative Production | A-55 |
| Density | A-56 |
| Table A-16 Vegetative Production when Livestock Are Removed from a Previously Moderately Grazed Range | A-57 |
| Table A-17 Density and Cover Values when Livestock Are Removed from a Previously Moderately Grazed Range | A-57 |
| Table A-18 Vegetative AUMs in the Long Term | A-58 |

TABLE A-4

SCIENTIFIC NAME EQUIVALENTS FOR COMMON NAMES OF PLANTS USED IN THE TEXT AND CAPTIONS

| Common Name | Code | Scientific Nomenclature |
|---|---|---|
| Grasses | | |
| Alkali sacaton | Spai | Sporobolus airoides |
| Annual windmill grass | Chvi | Chloris virgata |
| Black grama | Boer | Bouteloua eriopoda |
| Blue grama | Bogr | Bouteloua gracilis |
| Burrograss | Scbr | Scleropogon brevifolius |
| Bush muhly | Mupo | Muhlenbergia porteri |
| Dropseeds (sand, mesa, spike) | SPOR | Sporobolus spp. |
| Ear muhly | Muar | Muhlenbergia arenacea |
| Fluffgrass | Trpu | Tridens pulchellus |
| Galleta | Hija | Hilaria jamesii |
| Giant dropseed | Spgi | Sporobolus giganteus |
| Gyp dropseed | Spne | Sporobolus nealleyi |
| Indian ricegrass | Orhy | Oryzopsis hymenoides |
| Mesa dropseed | Spfl | Sporobolus flexuosus |
| Muhlys | MUHL | Muhlenbergia spp. |
| Needle and thread | Stco | Stipa comata |
| New Mexico feathergrass | Stne | Stipa neomexicana |
| Pappus grass | PAPP | Pappophorum spp. |
| Purple muhly | Muri | Muhlenbergia rigida |
| Ring muhly | Muto | Muhlenbergia torreyi |
| Sacaton | Spwr | Sporobolus wrightii |
| Saltgrass | Dist | Distichlis stricta |
| Sand dropseed | Spcr | Sporobolus cryptandrus |
| Side-oats grama | Bocu | Bouteloua curtipendula |
| Sixweeks fescue | Feoc | Festuca octoflora |
| Sixweeks grama | Boba | Bouteloua barbata |
| Sixweeks three-awn | Arad | Aristida adscensionis |
| Southwestern needlegrass | Stem | Stipa eminens |
| Spike dropseed | Spco | Sporobolus contractus |
| Squirreltail | Sihy | Sitanion hystrix |
| Three-awn | ARIS | Aristida spp. |
| Tobosa | Himu | Hilaria mutica |
| Vine mesquite | Paob | Panicum obtusum |
| Western wheatgrass | Agsm | Agropyron smithii |
| Wolftail | Lyph | Lycurus phleoides |
| Forbs | | |
| Amsonia | Amhi | Amsonia hirtella |
| Annual snakeweed | Gugl | Gutierrezia glutinosa |
| Bitterweed | Hyod | Hymenoxys odorata |
| Blueweed | Heci | Helianthus ciliaris |
| Buckwheats | ERIO | Eriogonum spp. |
| Carelessweed | AMAR | Amaranthus spp. |
| Castetter milkvetch | Asca | Astragalus castetteri |
| Cattails | Tyla | Typha latifolia |
| Cocklebur | Xasa | Xanthium saccharatum |
| Common bahia | BAHI | Bahia spp. |
| Cutleaf sunflower | Hela | Helianthus laciniatus |
| Flintmountain milkvetch | Assi | Astragalus siliceus |
| Grama cactus | Pepa | Pediocactus papyracanthus |
| Hog potato | Hode | Hoffmanseggia densiflora |
| Ladron spiderwort | Trwr | Tradescantia wrightii |
| Marsh parsley | Alfi | Aletes filifolius |
| Marsh sunflower | Hepr | Helianthus praetermissus |
| Mogollon draba | Drmo | Draba mogollonica |
| Multistem beeplant | Clmu | Cleome multicaulis |
| Paradox sunflower | Hepa | Helianthus paradoxus |
| Pecos bladderpod | Lepr | Lesquerella praecos |
| Plank's silene | Sipl | Silene plankii |
| Pricklepoppy | Arpl | Argemone pleiacantha |
| Rhizome fleabane | Errh | Erigeron rhizonmatous |
| Rock daisy | Pest | Perityle staurophylla |
| Russian thistle | Saka | Salsola kali |
| Sandy prairieclover | Pesc | Petalostemum scariosum |
| Scarlet figwort | Scco | Scrophularia coccinea |
| Sealavender | Lili | Limonium limbatum |
| Spectacle pod | Diwi | Dithyrea wislizeni |
| Tansy mustard | Depi | Descurainia pinnata |
| Vernal thelypody | Thve | Thelypodium vernale |
| Whorles milkweed | Assu | Asclepias subverticillata |
| Wooton loco | Aswo | Astragalus wootoni |
| Zuni milkvetch | Asac | Astragalus accumbens |

TABLE A-4 (continued)

SCIENTIFIC NAME EQUIVALENTS FOR COMMON NAMES OF PLANTS USED IN THE TEXT AND CAPTIONS

| Common Name | Code | Scientific Nomenclature |
|---|---|---|
| Shrubs and Trees | | |
| Alligator juniper | Jude | *Juniperus deppeana* |
| American tarbush | Flce | *Flourensia cernoa* |
| Apache-plume | Fapa | *Fallugia paradoxa* |
| Brickellbush | BRIC | *Brickellia* spp. |
| Burroburshr | HYME | *Hymenoclea* spp. |
| Cholla | Opim | *Opumtia imbricata* |
| Cottonwood | Pofr | *Populus fremontii* |
| Creosotebush | Latr | *Larrea tridentata* |
| Desert olive | Flsh | *Florestiera shrevei* |
| Desert rose | Rost | *Rosa stellata* |
| Desert sumac (Little-leaf) | Rhmi | *Rhus microphylla* |
| Feather dalea | Dafo | *Dalea formosa* |
| Four-wing saltbush | Atca | *Atriplex canescens* |
| Hairy coldenia | Cohi | *Coldenia hispidissima* |
| Hairy mountain mahogany | Cebr | *Cercocarpus breviflorus* |
| Jones saltbush | Atjo | *Atriplex jonesii* |
| Mariola | Pain | *Parthenium incanum* |
| Mesquite | Prju | *Prosopis juliflora* |
| Mormon tea | Eptr | *Ephedra trifurca* |
| Ocotillo | Fosp | *Fouquieria splendens* |
| One-seed juniper | Jumo | *Juniperus monosperma* |
| Pinyon | Pied | *Pinus edulis* |
| Prickly-leaf dogweed | Dyac | *Dyssodia acerosa* |
| Rabbitbrush | CHRY | *Chrysothanmnus* spp. |
| Saltcedar | Tape | *Tamarix pentandra* |
| Sand sagebrush | Arfi | *Artemisia filifolia* |
| Scrub live oak | Qutu | *Quercus turbinella* |
| Snakeweed | Gusa | *Gutierrezia sarothrae* |
| Spicebush | Alwr | *Aloysia wrightii* |
| Squawbush | Rhtr | *Rhus trilobata* |
| Willow | SALI | *Salix* spp. |
| Winterfat | Eula | *Eurotia lanata* |
| Wolfberry | LYCI | *Lycium* spp. |
| Yucca | YUCC | *Yucca* spp. |

Source: Spellenberg Consultants, 1977; and USDA-FS, 1974

Existing Environment

Range and Soil Survey

Vegetation in the ES Area was surveyed from 1975 to 1977. The range survey delineated vegetative types and determined vegetative density, composition, and grazing capacity of each range type. Soils were surveyed from 1976 to 1978. The soil survey process delineated soil mapping units, and these were correlated to range sites.

Relationship of Soils to Range Sites

Range sites are the ecological subdivisions used to study and evaluate the rangeland within the ES Area. Range sites, with their various environmental factors, are combined to designate MLRAs. MLRAs (as delineated by SCS) are geographic areas of land, several thousand acres in extent, that are characterized by particular patterns of soil, climate, water resources, and land use (Map 2-2). Range sites were correlated between the four MLRAs, in the ES Area (Table A-5, p. A-40), on the basis of species composition, proportion of species, and total production of the potential plant communities. A copy of the SCS Range Site Guides applicable for each kind of rangeland is maintained in the BLM Socorro District Office.

TABLE A-5

PHYSICAL CHARACTERISTICS OF FOUR MLRAs

| MLRAs | Approx. Elevation | Average Annual Precipitation | Temperature Regime of Soils | Topographic Features |
|---|---|---|---|---|
| Southern Desertic Basins, Plains and Mountains (SD) | 4,500-6,000 ft. | 7-9 in. | Thermic | Desert Basin and Valleys |
| Pecos - Canadian Plains and Valleys (CP) | 5,500-7,000 ft. | 8-10 in. | Mesic | Mesas, Valleys, and Mountains |
| New Mexico and Arizona Plateaus and Mesas | | | | |
| WP-2 | 6,000-8,000 ft. | 10-13 in. | Mesic | Plateaus and Mesas |
| WP-3 | 5,000-8,000 ft. | 10-13 in. | Mesic | Plateaus and Mesas |

Source: U. S. Department of Agriculture, Soil Conservation Service

Correlating Range Survey Data to Soil Survey Data

Range type boundaries were delineated on maps. A range type is a plant community with distinct and specific species composition, density, and vegetative aspect. Soils overlays were superimposed over the range type maps, and each range type was classified into a range site. The range type transect data, along with the appropriate range site designation, was summarized and averaged. Existing grazing capacity, vegetative density and cover, and weighted proper use factors were analyzed by vegetative type per range site, MLRA, and allotment.

Range Condition

Range condition was analyzed using a variation of the SCS method. Range condition is an expression of the relative degree to which the kinds, proportions, and amounts of plants in a plant community resemble that of the climax plant community for the site. Range condition was determined by comparing the present plant community with that of the climax plant community, as indicated by the range condition guide for the site.

The most recently developed SCS "Range Site . . . Guide" (1975) for rating range condition was used for each site. The amount of all climax species not in excess of that shown on the guide is totaled to indicate the relative ecological rating or numerical evaluation of the stand. This procedure is illustrated by Figure A-7, p. A-43. It shows that mesa

dropseed (Spfl) and sand dropseed (Spcr) make up 14 percent of the vegetative composition of the range types occurring on the loamy range site within allotment 293. However, according to the "Range Site . . . Guide," these species should make up 10 percent of the vegetative composition in the potential or climax community. Therefore, in this procedure, they only can count as 10 points in determining condition. The range condition rating would be between 0 and 100 depending on how closely the particular plant community resembles the climax plant community for the range site. Four classes are used to express the degree to which the composition of the present plant community reflects that of the climax. They are:

| Range Condition Class | Percentage of Present Plant Community that is Climax for the Range Site |
|---|---|
| Excellent | 76-100 |
| Good | 51-75 |
| Fair | 26-50 |
| Poor | 0-25 |

Therefore, in the example, range condition was classified as good.

TABLE A-6

EXISTING RANGE CONDITION OF ALLOTMENTS

| Allot. No. | Excellent Public | Excellent Other | Good Public | Good Other | Fair Public | Fair Other | Poor Public | Poor Other | No Cond. /1 Public | No Cond. /1 Other | % /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AMPs | | | | | | | | | | | |
| 002 | | | 2,530 | 4,865 | 9,188 | 22,478 | 1,812 | 4,911 | 1,042 | 1,697 | 84 |
| 006 | | | 2,148 | 496 | 8,706 | 1,605 | 396 | 380 | | | 81 |
| 012 | | | 22 | 31 | 1,547 | 870 | | | 225 | 34 | 98 |
| 016 | | | | | 11,832 | 11,558 | 169 | 222 | 511 | 1,545 | 100 |
| 036 | | | | | 9,050 | 112 | 1,807 | 24 | 1,102 | 1 | 100 |
| 037 | | | 9,177 | 1,225 | 2,457 | 824 | | | 241 | 152 | 24 |
| 052 | | | | | 1,376 | 686 | | | | 34 | 100 |
| 058 | | | 1,768 | 638 | 1,698 | 320 | 153 | | | | 47 |
| 059 | | | 9,189 | 3,729 | 8,450 | 5,580 | | | 389 | 353 | 52 |
| 065 | | | 576 | 867 | 9,723 | 15,883 | 861 | 1,952 | 1,107 | 2,123 | 95 |
| 077 | | | 2,022 | 779 | 373 | 1,058 | | | 1,881 | 460 | 34 |
| 081 | | | 233 | 150 | 5,246 | 161 | 230 | 9 | 160 | | 94 |
| 083 | | | 470 | | 164 | | | | | | 35 |
| 086 | | | 13,093 | 1,022 | 10,516 | 2,456 | 123 | 489 | 186 | | 49 |
| 089 | | | | | 292 | 256 | 21 | 23 | 8 | 44 | 100 |
| 090 | | | 2,513 | 1,061 | 6,418 | 3,573 | 78 | 66 | 180 | 10 | 74 |
| 091 | | | 986 | | 5,922 | 66 | | | 486 | 14 | 86 |
| 114 | | | 3,293 | 5,288 | 10,636 | 18,242 | 1,375 | 2,349 | 1,615 | 3,775 | 79 |
| 121 | | | 3,135 | 122 | 3,747 | 1,805 | | | 649 | 250 | 63 |
| 122 | | | | | 1,666 | 636 | 632 | | 502 | 1,981 | 100 |
| 129 | | 57 | 1,389 | 1,197 | 24,166 | 25,812 | 4,366 | 8,586 | 4,629 | 2,143 | 96 |
| 131 | | | 102 | 434 | 3,277 | 6,654 | | 473 | | | 95 |
| 152 | | | 1,623 | 1,893 | 8,719 | 14,485 | 292 | 1,693 | 876 | 2,497 | 88 |
| 250 | | | | | 6,843 | 1,445 | 5,762 | 2,095 | 344 | 1,481 | 100 |
| 251 | | 65 | 3,563 | 3,176 | 3,867 | 6,133 | | 33 | | 359 | 60 |
| 252 | | | 8,065 | 1,006 | 8,313 | 2,311 | 1,262 | 328 | | | 57 |
| 253 | | | 693 | 6 | 1,824 | | 594 | | | | 78 |
| 254 | | | 11,361 | 2,880 | 3,659 | 584 | 2,054 | 274 | 3,814 | 537 | 32 |
| 255 | | | | 119 | 2,373 | 757 | 2,350 | 528 | | | 98 |
| 256 | | | 4,072 | 948 | 7,896 | 1,995 | 714 | 162 | | | 68 |
| 258 | | | | | 7,100 | 1,694 | 3,816 | 261 | | | 100 |
| 260 | | | 3,523 | 1,125 | 4,966 | 3,449 | 291 | 103 | 3,691 | 1,247 | 65 |
| 261 | | | 1,862 | 576 | 15,482 | 4,584 | 524 | 189 | 6,848 | 53 | 89 |
| 262 | | | 391 | 411 | 11,622 | 10,547 | 298 | 130 | | | 97 |
| 263 | | | 4,817 | 1,556 | 8,005 | 3,919 | 182 | 1,590 | 650 | 881 | 68 |
| 264 | | | 191 | 170 | 8,284 | 1,718 | 84 | 193 | | | 97 |
| 266 | | | 5,698 | 1,511 | 3,397 | 9 | | | 2,264 | 638 | 32 |
| 268 | | | 7,955 | 2,142 | 18,399 | 7,294 | | | 13 | 92 | 72 |
| 271 | | | 5,318 | 4,876 | 5,852 | 3,887 | 222 | | | | 49 |
| 272 | | | 7,068 | 2,074 | 5,497 | 998 | 451 | 128 | 6,406 | | 44 |
| 275 | | | 11,082 | 13,281 | 17,674 | 20,606 | 1,698 | 4,529 | 2,306 | 2,048 | 65 |
| 276 | | | 2,083 | 680 | 277 | | | | | | 9 |
| 277 | | | | | 7,402 | 2,580 | 7,467 | 2,424 | 3,400 | 3,419 | 100 |
| 279 | | | | | 8,527 | 1,461 | 5,483 | 768 | 4,399 | 520 | 100 |
| 280 | | | 8,449 | 1,440 | 3,578 | 2,353 | | | 1,580 | 629 | 37 |
| 283 | | | 171 | 39 | 14,328 | 5,009 | 1,810 | 1,352 | | 151 | 99 |
| 284 | | | | | 8,535 | 2,891 | 205 | 31 | | | 100 |
| 285 | | | 7,402 | 131 | 14,148 | 6,031 | | | 120 | 43 | 73 |
| 287 | | | 3 | 141 | 4,311 | 659 | | | | | 97 |

TABLE A-6 (continued)

EXISTING RANGE CONDITION OF ALLOTMENTS



| Allot. No. | Excellent Public | Excellent Other | Good Public | Good Other | Fair Public | Fair Other | Poor Public | Poor Other | No Cond. /1 Public | No Cond. /1 Other | % /2 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| AMPs (cont.) | | | | | | | | | | | |
| 288 | | | | | 2,063 | | 2,350 | 600 | 93 | 196 | 100 |
| 289 | | | 3,472 | 1,473 | 4,605 | 1,120 | | | | | 54 |
| 290 | | | 2,950 | 2,495 | 4,440 | 2,457 | | | 195 | 189 | 56 |
| 291 | | | 5,796 | 685 | 3,708 | 265 | | | 162 | 10 | 38 |
| 293 | | | 16,846 | 2,315 | 20,579 | 3,161 | | | | | 55 |
| 294 | | | 138 | 597 | 1,196 | 4,863 | 3,009 | 1,135 | 130 | 463 | 93 |
| 295 | | | 2,463 | 3,593 | 5,806 | 8,141 | | | 367 | 795 | 70 |
| 297 | | | | | 4,527 | 1,134 | 9,340 | 4,188 | 618 | 189 | 100 |
| 298 | | | 1,823 | 3,154 | 1,053 | 1,486 | | | | | 34 |
| 299 | | | | | 9,852 | 1,481 | 303 | 5 | 1,187 | 106 | 100 |
| 300 | | | | | 1,168 | 834 | | 58 | 411 | 1,028 | 100 |
| 301 | 1,241 | 1,838 | 5,066 | 3,821 | 9,590 | 7,899 | 1,810 | 434 | | 4 | 62 |
| 303 | | | 285 | | 422 | | | | | | 60 |
| 306 | | | | | 5,131 | 1,029 | | | | | 100 |
| 308 | | | | | 4,074 | 598 | 165 | | 597 | 93 | 100 |
| 312 | | | | | 1,577 | | 7,668 | 47 | 158 | | 100 |
| 315 | | | | | 3,133 | 779 | 106 | | 268 | 42 | 100 |
| 317 | | | | | 434 | | 2,240 | 188 | 537 | 346 | 100 |
| 318 | | | | | 3,330 | 115 | 1,835 | 48 | | | 100 |
| 321 | | | 252 | | 4,969 | 6,295 | | 42 | 14 | 1 | 98 |
| 322 | | | 90 | 134 | 10,610 | 4,120 | | | 143 | 2,469 | 99 |
| 323 | | | 4,050 | 2,951 | 3,115 | 2,570 | | | 182 | 449 | 45 |
| 325 | | | 5,890 | 1,607 | 2,571 | 2,454 | 605 | 641 | 98 | | 46 |
| 327 | | | 3,108 | 237 | 5,864 | 2,604 | | | | | 72 |
| 328 | | | 2,878 | 699 | 1,022 | 946 | 590 | 275 | | | 44 |
| 330 | 2,169 | 1,716 | 67 | 1,422 | 876 | 1,874 | | | | | 35 |
| 347 | | | 470 | 114 | | | | | | | 0 |
| 348 | | | 1,611 | 61 | 587 | 99 | | | | | 29 |
| 349 | | | 534 | 4 | 777 | | | | | | 59 |
| 360 | | | 205 | 317 | 2,422 | 1,438 | | | | | 88 |
| NON-AMPs | | | | | | | | | | | |
| 017 | | | | | 3,122 | | | | | | 100 |
| 113 | | | | | 103 | | 187 | | | | 100 |
| 134 | | | | | 6 | | 1,392 | | | | 100 |
| 143 | | | | | 310 | | | | | | 100 |
| 145 | | | 320 | | 3,622 | | | | | | 92 |
| 164 | | | | | | | 203 | | | | 100 |
| 165 | | | 15 | | 21 | | 60 | | | | 84 |
| 267 | | | 2,448 | | | | | | | | 0 |
| 281 | | | 2,424 | | 3,290 | | | | | | 58 |
| 282 | | | | | 960 | | | | | | 100 |
| 286 | | | | | | | 371 | | 5 | | 100 |
| 296 | | | 5,312 | | 1,012 | | | | | | 16 |
| 302 | | | | | | | 371 | | 4 | | 100 |
| 310 | | | 1,298 | | 76 | | | | | | 6 |
| 311 | | | | | | | 79 | | 30 | | 100 |
| 340 | | | 1,688 | | 397 | | | | | | 19 |
| 341 | | | 106 | | | | | | | | 0 |
| 342 | | | 831 | | 823 | | | | | | 50 |
| 343 | | | 1,543 | | | | | | | | 0 |
| 345 | | | 956 | | | | 102 | | 135 | | 10 |
| 350 | | | 202 | | 1,148 | | | | | | 85 |
| 351 | | | 209 | | 1,238 | | | | 133 | | 86 |
| 352 | | | 3,498 | | 300 | | | | | | 8 |
| 353 | | | 630 | | 830 | | | | | | 57 |
| 354 | | | | | 80 | | | | | | 100 |
| 355 | | | 1,696 | | | | | | 19 | | 0 |
| 356 | | | | | 510 | | 71 | | | | 100 |
| 357 | | | | | 48 | | 911 | | 168 | | 100 |
| 358 | | | 2,340 | | 36 | | | | | | 2 |
| 361 | | | 402 | | 78 | | | | | | 16 |
| 362 | | | 98 | | 65 | | | | | | 40 |
| 363 | | | | | | | | | 2,379 | | 0 |
| TOTAL | 3,410 | 3,676 | 232,046 | 87,761 | 484,904 | 285,796 | 81,350 | 43,956 | 59,657 | 35,591 | |

/1 No Condition - These are areas where SCS has not developed range site guides. This is because these areas are low producing sites such as badlands, steep slopes, and river washes. In addition, a small amount of acreage was included because a soil survey was not completed.
/2 Percent of allotment in poor and fair range condition.

Source: Range Survey, Socorro County Soil Survey, SCS Range Site Guides

Figure A-7

Allotment - Malpais 293

Range Site: Loamy (SD)

Range Types: BH-38, BH-40

COMPARISON OF "RANGE SITE GUIDE" TO "RANGE TYPE WRITEUPS" IN DETERMINING RANGE CONDITION

| Species | Potential* | Average of the Range Types* | Range Condition Points |
|---|---|---|---|
| Grasses | | | |
| Black grama | 20 | 10 | 10 |
| Bush muhly | 20 | 0 | 0 |
| Burrograss, Three-awn, Ring muhly, Fluffgrass | 10 | 11 | 10 |
| Sand Dropseed, Mesa dropseed | 10 | 14 | 10 |
| Galleta, Alkali sacaton | 20 | 47 | 20 |
| Cane bluestem, Bristlegrass, Arizona cottontop | 5 | 0 | 0 |
| Maximum Points Allowed For Grasses | 80 | | |
| Forbs | | | |
| Annual | | | |
| Perennial | | | |
| Maximum Points Allowed For Forbs | 10 | | |
| Shrubs | | | |
| Yucca, Mormon tea, Four-wing saltbush | 15 | 1 | 1 |
| Broom snakeweed | 3 | | |
| Mesquite, Cactus | 3 | | |
| Maximum Points Allowed For Shrubs | 10 | | |

Total: 51
Range Condition: Good

* Values are percent composition (i.e., Black grama makes up 20 percent of the potential plant community).

Source: Range Survey and SCS Range Site Guides, Socorro District

Range Trend

Range trend is unknown over most of the ES Area. This includes allotments with and without AMPs. Therefore, because of a lack of reliable data for the purpose of analysis, range trend is assumed to be stable. This assumption is based on the following:

1. Socorro District personnel determined apparent range trend on 23 allotments during 1977. Trend was estimated to be static on 19 allotments, down on 3, and up on 1.
2. In addition, 20 sites were selected throughout the ES Area. The trend of vegetative and soil conditions on these sites was estimated by comparing the 1975 aerial photographs to those taken during the 1950's. It was not possible to detect any changes on most of the photos.
3. A 24-year study on allotment 268 suggests that trend is up on some sites within its boundaries. However, the plots are not representative of the entire allotment. The results of this study are contained in the BLM Socorro District Office.

Long-Term Predictions

Range Condition

The existing range condition data and the vegetal increases predicted by the AMP writers were used as the basis for predicting future range condition. It was assumed that an increase in vegetal AUMs reflects an improvement in range condition. For each projected 1-percent increase in vegetation, a .2-percent increase in the total acreage that improves by one range condition class is projected. Table A-7 shows projections of improved range condition made for the Proposed Action and each alternative.

Table A-7

PREDICTION OF RANGE CONDITION

| Projected Vegetal Increase (From Table A-18) | Total Acreage that Improves by One Range Condition Class | Total Acreage that Remains in the Same Condition Class |
|---|---|---|
| 25 percent | 5 percent | 95 percent |
| 50 percent | 10 percent | 90 percent |
| 75 percent | 15 percent | 85 percent |
| 100 percent | 20 percent | 80 percent |

For example: Total vegetation under the No Action Alternative is expected to increase 9 percent (from Table A-18, p. A-58) in the long term. Therefore, the acreages in the excellent, good, and fair condition classes are projected to increase by 1.8 percent.

Potential Production

A variation of the SCS method was used to estimate potential production. The soil mapping units delineated during the soil survey were classified into range sites. The respective SCS Range Site Guides were used to estimate the total potential production for each site in each MLRA. Four steps are used to calculate potential grazing capacity in ac/AUM. The steps are illustrated using the sandy range site in the SD MLRA.

Step 1. Potential vegetative production was interpreted from the SCS Range Site Guide as follows:

| | |
|---|---|
| Favorable year (SCS Range Site Guide) | 750 lbs/ac |
| Unfavorable year (SCS Range Site Guide) | 250 lbs/ac |
| Average year (BLM estimate) | 500 lbs/ac |

Step 2. The weighted proper use factor (PUF) for the range site was calculated by applying the Socorro District PUF to each species occurring in the climax community. It is found by multiplying the composition (in percent) of a plant species by PUF for that species. This is a weighted PUF for an individual species. The sum of the weighted PUFs equals the weighted PUF for the range site. Table A-8, p. A-45, shows how the weighted PUF is calculated.

Step 3. The forage requirement of an AUM was determined to be 750 lbs/AUM.

Step 4. Calculations for determining potential productivity, usable forage, and grazing capacity on a 640-acre sandy range site:

a. Acres times potential production (SCS Range Site Guide) equals total potential production per section
640 ac. x 500 lbs/ac = 320,000 lbs/section

b. Total potential production per section times weighted PUF equals potential usable forage per section.
320,000 lbs/sec. x .333 = 106,560 lbs/section

c. Potential usable forage per section divided by forage requirements of an AUM equals potential production expressed in ac/AUM.
106,560 lbs/sec. ÷ 750 lbs/AUM = 142 AUMs/section
640 ac ÷ 142 AUMs = 4.5 Ac/AUM

The potential production for range sites is summarized in Table A-9, p. A-46.

TABLE A-8

EXAMPLE OF HOW THE WEIGHTED PROPER USE FACTOR WAS CALCULATED FOR THE SANDY(SD) RANGE SITE

| Species | Composition of the Potential Plant Community | PUF%/1 | | Weighted PUF |
|---|---|---|---|---|
| Grasses | | | | |
| Black grama | 25 | 55 | | .1375 |
| Mesa dropseed | | 50 | | |
| Sand dropseed | 15 | 50 | 50 | .075 |
| Spike dropseed | | 50 | | |
| Bush muhly | | 45 | | |
| Bristlegrass | 10 | 30 | 40 | .04 |
| Arizona cottontop | | 55 | | |
| Cane bluestem | | 30 | | |
| Tobosa | 5 | 45 | | .0225 |
| Three-awn | 10 | 10 | | .01 |
| Fluffgrass | 5 | 40 | | .02 |
| Forbs | | | | |
| Croton | | 5 | | |
| Buckwheat | | 0 | | |
| Globemallow | | 10 | | |
| Astragalus spp. | | 0 | | |
| Euphorbia spp. | 10 | 0 | 2.2 | .002 |
| Spectacle pod | | 5 | | |
| Desert holly | | 0 | | |
| Desert bailya | | 0 | | |
| Filaree | | 0 | | |
| Threadleaf groundsel | | 0 | | |
| White horsenettle | 5 | 0 | 2.5 | .0013 |
| Russian thistle | | 10 | | |
| Tansy mustard | | 0 | | |
| Woody | | | | |
| Soaptree yucca | 10 | 15 | 17.5 | .0175 |
| Mormon tea | | 20 | | |
| Sandsage | | 10 | | |
| Four-wing saltbush | | 50 | | |
| Mountain mahogany | 3 | 40 | 20.2 | .0061 |
| Broom snakeweed | | 1 | | |
| Broom dalea | | 0 | | |
| Mesquite | 2 | 10 | 7.5 | .0015 |
| Cholla | | 5 | | |
| | | | Weighted Proper Use Factor = | .3334 |

/1 Bureau of Land Management, Socorro District. Proper Use Factors

Source: SCS Range Site Guide and Range Survey, Socorro District

TABLE A-9

POTENTIAL PRODUCTIVITIES OF RANGE SITES

| Range Site | Total Production lbs/ac. | PUF | Usable Forage lbs/ac. | Grazing Capacity CYLs/sec. | AUMs/sec. | ac/AUMs |
|---|---|---|---|---|---|---|
| Southern Desert (SD) | | | | | | |
| Deep Sand | 425.0 | .324 | 137.7 | 9.8 | 117.5 | 5.4 |
| Sandy | 500.0 | .333 | 166.5 | 11.8 | 142.1 | 4.5 |
| Shallow Sandy (656) 30% Rock Outcrop | 341.3 | .408 | 139.2 | 9.9 | 118.8 | 5.4 |
| Loamy | 425.0 | .399 | 169.6 | 12.1 | 144.7 | 4.4 |
| Bottomland | 1,550.0 | .421 | 652.6 | 46.4 | 556.8 | 1.2 |
| Limestone Hills (634) 30% Rock Outcrop | 315.0 | .338 | 106.5 | 7.6 | 90.9 | 7.0 |
| Malpais (657) 35% Rock Outcrop | 316.9 | .464 | 147.0 | 10.5 | 125.5 | 5.1 |
| Gypsum | 200.0 | .307 | 61.4 | 4.4 | 52.4 | 12.2 |
| Gravelly | 312.5 | .260 | 67.5 | 4.8 | 57.4 | 11.1 |
| Igneous Hills (689) 50% Rock Outcrop | 250.0 | .339 | 84.8 | 6.0 | 72.3 | 8.9 |
| Pecos-Canadian Plains and Valleys (CP) | | | | | | |
| Sandy | 575.0 | .382 | 219.7 | 15.6 | 187.4 | 3.4 |
| Loamy | 450.0 | .365 | 164.3 | 11.7 | 140.2 | 4.6 |
| Bottomland | 2,500.0 | .442 | 1,105.0 | 78.6 | 942.9 | 0.7 |
| Limestone Hills (35% Rock Outcrop) | 260.0 | .312 | 81.0 | 5.8 | 69.0 | 9.3 |
| Gravelly | 675.0 | .397 | 268.0 | 19.1 | 229.0 | 2.8 |
| Gypsum Hills | 325.0 | .307 | 100.0 | 7.1 | 85.1 | 8.9 |
| Hills (40% Rock Outcrop) | 435.0 | .472 | 205.0 | 14.6 | 175.0 | 3.7 |
| Gypsum (736-Neeto) | 353.0 | .409 | 144.4 | 10.3 | 123.5 | 5.2 |
| Malpais | 600.0 | .358 | 214.8 | 15.3 | 183.0 | 3.5 |
| New Mexico and Arizona Plateaus and Mesas (WP-2) | | | | | | |
| Basalt Hills | 975.0 | .409 | 398.8 | 28.0 | 340.0 | 1.9 |
| Bottomland | 2,800.0 | .532 | 1,489.6 | 106.0 | 1,271.0 | 0.5 |
| Gypsum Flats | 225.0 | .306 | 68.9 | 4.9 | 58.8 | 10.9 |
| Loamy | 600.0 | .416 | 249.7 | 18.0 | 213.0 | 0.3 |
| Malpais | 800.0 | .365 | 291.8 | 21.0 | 249.0 | 2.6 |
| Sandstone Hills | 450.0 | .316 | 165.6 | 12.0 | 141.0 | 4.5 |
| Sandy | 525.0 | .407 | 213.7 | 15.0 | 182.0 | 3.5 |
| Shallow | 600.0 | .407 | 244.2 | 17.0 | 208.0 | 3.1 |
| Shallow Sandstone | 500.0 | .383 | 191.3 | 14.0 | 163.0 | 3.9 |
| Limestone Hills | 625.0 | .340 | 212.5 | 15.0 | 181.0 | 3.5 |
| New Mexico and Arizona Plateaus and Mesas (WP-3) | | | | | | |
| Basalt Hills | 975.0 | .409 | 398.8 | 28.0 | 340.3 | 1.9 |
| Bottomland | 2,750.0 | .518 | 1,424.5 | 101.0 | 1,216.0 | 0.5 |
| Gravelly | 1,050.0 | .461 | 483.5 | 34.0 | 413.0 | 1.5 |
| Hills | 1,000.0 | .366 | 365.9 | 26.0 | 312.0 | 2.1 |
| Loamy | 750.0 | .404 | 302.6 | 22.0 | 258.0 | 2.5 |
| Malpais | 800.0 | .365 | 291.8 | 21.0 | 249.0 | 2.6 |
| Sandy | 650.0 | .392 | 254.8 | 18.0 | 217.0 | 2.9 |
| Shallow | 950.0 | .417 | 396.2 | 28.0 | 338.0 | 1.9 |
| Limestone Hills | 625.0 | .340 | 212.5 | 15.0 | 181.0 | 3.5 |

Source: Range Site Guides, Socorro District

Proposed Action

Assumptions

In the Proposed Action utilization of key species would average 50 percent. Present utilization of vegetation is heavy (60 to 80 percent). There would be a 30-percent reduction in livestock numbers. Since no actual livestock use data is available, it is assumed that the Proposed Action is reducing utilization from a heavy to a moderate level.

Methods

The AMP writers selected from two to seven key areas on each allotment scheduled for an AMP. Key areas guide the general management of the entire area.

The AMP writers also located "comparison areas" for most of the key areas. Comparison areas are generally located on the same allotment as its key area and usually support a higher successional stage of vegetation. The better vegetative conditions are due to a lighter use or no livestock grazing and indicate the goal for which the BLM will manage.

Vegetative parameters on key areas were compared to the vegetation on associated comparison areas. The comparisons were based on the data gathered by using the toe-point transects to determine species composition and density in both areas. All key and comparison area data is filed in the respective AMPs in the BLM Socorro District Office. The AMP writers then used their judgment based on comparison area data and predicted how much vegetation would improve on key areas in the long term. They did not try to separate the effects of livestock adjustments from those of grazing system implementation; instead they expected both actions to occur simultaneously. Below is an example of how the predicted increases were determined using key and comparison area data for allotment 293. The key area is located in vegetative subtype HT-40 which was used as the example in Appendix 1, Range Survey Methodology (Figure A-3, p. A-12). The comparison area is located on White Sands Missile Range which has been ungrazed since the early 1940s.

| Key Area #3 | | | Comparison Area #3 | | |
|---|---|---|---|---|---|
| % Forage Density | Key Species | % Comp. | % Forage Density | Key Species | % Comp. |
| | Boer | 57 | | Boer | 75 |
| | Spfl | 20 | | Spfl | 5 |
| | Spco | 4 | | Spco | 1 |
| 11 | | | 17 | | |

PREDICTION FOR KEY AREA #3 IN THE LONG TERM

| % Forage Density | Key Species | % Comp. |
|---|---|---|
| | Boer | 70 |
| | Spfl | 10 |
| | Spco | 4 |
| 15 | | |

The same kind of predictions were made for every set of key and comparison area data from all 79 AMPs. The soil survey information and maps were then used to classify each area the predictions represented into range sites. Key and comparison areas #3 shown above are located on a sandy range site within the Southern Desert (SD) MLRA. These predictions were added to all sandy SD prediction data. Average predicted increases in density, cover, and composition were then computed using the same technique for each range site by MLRA. Using these average predicted increases, predicted vegetative production for the Proposed Action at year 2000 was computed for each range site by MLRA and expressed in ac/AUM using the same procedure as in the range survey. Table 2-2 shows the average grazing capacity (ac/AUM) for each range site in the ES Area for the Existing Environment (EE) and the Proposed Action (PA) and alternatives by vegetative type and MLRA. The predictions made based on key and comparison areas #3, from allotment 293, are expressed in the average ac/AUM figures shown for the sandy range site, desert shrub vegetative type, SD-MLRA. The grazing capacity expressed in ac/AUM for this site is projected to improve from 10.3 ac/AUM to 6.2 ac/AUM.

The last step was to then divide the number of acres in each range site (by allotment) by the predicted change (ac/AUM) to get predicted vegetative AUMs. This was done for each range site (by allotment) to arrive at the total predicted vegetative AUMs for each allotment. The total predicted vegetative AUMs under the Proposed Action for Allotment 293 is 8,286 and is shown on Table A-18, p. A-58.

To arrive at the long term (20th year) predicted livestock AUMs, the long term wildlife AUMs, and unsuitable AUMs were deducted from predicted vegetative AUMs. The long-term predicted livestock use levels are shown for each allotment on Table A-24, p. A-83. For allotment 293, the AUMs needed to provide adequate forage for predicted wildlife numbers is 166. Refer to Appendix 1, p. A-15, Methodology for Determining Existing Deer and Existing and Predicted Antelope Numbers. There is no unsuitable range on allotment 293. As shown on Table A-18, p. A-58, total long-term vegetative AUMs for allotment 293 for the Proposed Action are 8,286. Therefore:

8,286 (Predicted long-term vegetative AUMs) - 166 (Predicted long-term wildlife AUMs)

= 8,120 (Predicted long-term livestock AUMs, Table A-24, p. A-86)

No Action Alternative

Assumptions

Two assumptions are needed before the No Action Alternative can be analyzed: 1) Livestock use would be adjusted on the 25 existing AMP allotments, and these allotments would continue to be intensively managed; 2) Livestock use on the other allotments would not be adjusted, and AMPs would not be implemented.

Methods

Because of the adjustments and continued intensive management, the vegetative improvement on the 25 existing AMPs would be the same as for the Proposed Action. On the other allotments vegetative conditions would not improve but would be the same as in the Existing Environment.

Vegetative Production

Existing AMP Allotments

Under the No Action Alternative existing AMPs would receive livestock adjustments as in the Proposed Action and would continue to be intensively managed. Long-term predictions would be the same as under the Proposed Action. Vegetative production on existing AMP allotment 058 is going to increase to 630 AUMs in the long term, the same response as under the Proposed Action (Table A-18, p. A-58). Livestock forage in the long term would be 613 AUMs (Table A-24, p. A-83). Long-term livestock forage equals long-term vegetative production (630 AUMs) minus long-term wildlife allocation (17 AUMs)

Proposed AMP Allotments

Proposed AMP allotments under this alternative would not receive livestock adjustments or AMPs. For allotment 293 livestock use would remain at the present grazing use level, 6,264 AUMs (Table A-1, p. A-4), in both the short and long term. This is also shown on Table A-24, p. A-86.

Livestock Adjustment Alternative

Assumptions

All non-AMP allotments for both the Proposed Action and this alternative would respond similarly because of livestock adjustments.

This alternative assumes that livestock adjustments would be made and no additional AMPs would be implemented. However, the 25 existing AMP allotments would continue to be intensively managed. Thus, vegetative AUMs on these allotments would be the same as for the Proposed Action.

Methods

Grazing systems and grazing intensity studies were reviewed. The grazing research literature was interpreted to derive the following predictions:

1. Table A-10, p. A-50, shows that vegetative production would increase 51 percent when livestock use is reduced from heavy to moderate. The 51 percent is an overall average for the western states and is used because no site specific research is available. Table A-11, p. A-50, shows that vegetative production would increase by 18 percent when grazing systems are implemented. The 18 percent is an overall average for the western states and is used because no site specific research is available. These values were adjusted proportionally to account for the total vegetative increase predicted in the Proposed Action. Thus, grazing systems and livestock adjustments account for 26 and 74 percent of the vegetal increases predicted in the Proposed Action, respectively.

2. Table A-12, p. A-51, shows that density and cover would increase by 75 percent when grazing is reduced from heavy to moderate. The 75 percent is an overall average for the western states and is used because no site specific research is available. Table A-13, p. A-51, shows that density and cover would increase by 30 percent when grazing systems are implemented on ranges that have been continuously grazed. The 30 percent is an overall average for the western states and is used because no site specific research is available. These values were adjusted proportionally to account for the total density and cover increase predicted in the Proposed Action. Thus, grazing systems and livestock adjustments account for 29 and 71 percent of the increases predicted in the Proposed Action, respectively.

Vegetative Production

Existing AMP Allotments

Under the Livestock Adjustment Alternative existing AMPs would receive livestock adjustments as in the Proposed Action and would continue to be intensively managed; long-term predictions would be the same as under the Proposed Action. Vegetative production on existing AMP allotment 058 is going to increase to 630 AUMs in the long term; this would be the same response as under the Proposed Action (Table A-18, p. A-58). Livestock forage in the long term would be 613 AUMs (Table A-24, p. A-83). Long-term livestock forage (613) equals Long term vegetative production (630 AUMs) minus Long-term wildlife allocation (17 AUMs).

Proposed AMP Allotments

Of the vegetative production increases expected in the Proposed Action, 74 percent are due to the livestock adjustments. The AUMs expected on allotments (Excluding the 35 existing AMP allotments) under the Livestock Adjustment Alternative in the long term

= (.74) (Long-term Proposed Action AUMs - Range Survey AUMs) + (Range Survey AUMs).

Allotment 293 for example:

| | |
|---|---|
| Range Survey AUMs | = 6,267 (Table A-18, p. A-58) |
| Long-term Proposed Action AUMs | = 8,286 (Table A-18, p. A-58) |
| Long-term Livestock Adjustment AUMs | = [.74 (8,286 - 6,267)] + 6,267 |
| | = 7,761 (Table A-18, p. A-58) |

Density

Density and cover values were calculated for range sites by vegetative type and MLRA (Table 2-2). Each value is a weighted average for the total area of a range site by vegetative type and MLRA.

Of the density and cover increases expected in the Proposed Action, 71 percent are due to the livestock adjustments. The density and cover expected under the Livestock Adjustment Alternative

= (.71) (Long-term Proposed Action Density - Range Survey Density) + (Range Survey Density).

Example:

For the Sandy Range Site, Desert Shrub vegetative type, SD-MLRA, Table 2-2.

Range Survey Density = .11
Long-Term Proposed Action Density = .14

Long-Term Livestock Adjustment Density = .71 (.14 - .11) + .11
= .13

TABLE A-10

VEGETATIVE PRODUCTION WHEN LIVESTOCK USE IS REDUCED FROM HEAVY TO MODERATE

| Percent Change | Heavy Grazing (60-80%) (lbs/ac.) | Moderate Grazing (40-60%) (lbs/ac.) | Comments | Adapted From |
|---|---|---|---|---|
| 139* | 481 | 1,149 | Mid-grasses | Reardon and Merrill (1976) |
| 1* | 1,399 | 1,409 | Mid-grasses | Klipple and Bement (1961) |
| 49 | 974 | 1,454 | Mid-grasses | Klipple et al (1961) |
| | -400** | 0 | Mid-grasses | Klipple et al (1961) |
| 98 | 62 | 122 | Mid-grasses | Klipple et al (1961) |
| 14 | 1,096 | 1,245 | Short grass | Klipple et al (1961) |
| 42 | 470 | 668 | Blue grama | Klipple et al (1961) |
| 8* | 520 | 561 | Blue grama | Hanson et al (1970) |
| 137* | 76 | 180 | Black grama | Valentine (1970) |
| 137* | 19 | 45 | Black grama | Valentine (1970) |

Average: 51

* Treated as outlyers
** In this study, heavy grazing produced 400 lbs/ac less than a comparable area grazed moderately.

Source: References cited above

TABLE A-11

VEGETATIVE PRODUCTION WHEN GRAZING SYSTEMS ARE IMPLEMENTED ON RANGELANDS THAT HAVE PREVIOUSLY BEEN GRAZED CONTINUOUSLY WITH A MODERATE OR PROPER STOCKING RATE

| Percent Change | Grazing Systems (lbs/ac.) | Continuous Use (Proper Stocking) (lbs/ac.) | Adapted From |
|---|---|---|---|
| 18 | 368 | 312 | Martin and Ward (1967) |
| 39* | 89 | 64 | Martin (1973) |
| 15 | 12,396 | 10,773 | Owensby, Smith, and Anderson (1974) |
| 20 | 11,619 | 9,644 | Owensby, Smith, and Anderson (1974) |
| 18 | 731 | 620 | Smoliak (1960) |
| 5* | 489 | 465 | Smoliak (1960) |
| 214* | 319 | 102 | Aldon and Garcia (1967) |
| 254* | 552 | 156 | Rio Puerco ES (1978) |

Average: 18

* Treated as outlyers

Source: References cited above

TABLE A-12

DENSITY AND COVER VALUES WHEN GRAZING IS REDUCED FROM HEAVY TO MODERATE USE

| Percent Change | Density and Cover: Heavy Grazing (60-80%) | Density and Cover: Moderate Grazing (40-60%) | Comments | Adapted From |
|---|---|---|---|---|
| 87 | 477 | 839 | Litter, lbs/ac. | Reardon and Merrill (1976) |
| 150* | 18 | 45 | Percent | Pond (1961) |
| 75 | 44 | 77 | Percent | Pond (1961) |
| 69 | 45 | 76 | Percent | Pond (1961) |
| 24 | 1,232 | 1,531 | Standing Dead and Mulch, lbs/ac. | Hanson et al (197D) |
| 95 | 21 | 41 | Percent | Valentine (197D) |
| 97 | 35 | 69 | Percent | Valentine (197O) |

Average: 75

* Treated as outlyer

Source: References cited above

TABLE A-13

DENSITY AND COVER VALUES WHEN GRAZING SYSTEMS ARE IMPLEMENTED ON RANGELANDS THAT HAVE PREVIOUSLY BEEN GRAZED CONTINUOUSLY WITH A MODERATE OR PROPER STOCKING RATE

| Percent Change | Density and Cover: Grazing Systems | Density and Cover: Yearlong (Proper Stocking) | Adapted From |
|---|---|---|---|
| 43 | 1 (No./ft.$^2$) | .7 (No./ft.$^2$) | Martin (1973) |
| 27 | .62 (No./ft.$^2$) | .49 (No./ft.$^2$) | Martin (1973) |
| 232* | Forbs and shrubs increased (basal area) | | Smoliak (196D) |
| 0* | Grasses (basal area) | | Smoliak (1960) |
| 20 | 1,DO7 (lbs./acre) | 839 (lbs./acre) | Reardon and Merrill (1976) |

Average: 30

* Treated as outlyers

Source: References cited above

Pasture Capacity Level Alternative

Assumptions

In the Pasture Capacity Level Alternative grazing use would be reduced even further than in the Proposed Action. Utilization would be reduced from a moderate (4D to 6D percent) to a light (2O to 4D percent) level.

1. Table A-14, p. A-52, shows that vegetal production should increase by 22 percent when livestock use is reduced from a moderate to light level. The 22 percent is an overall average for the western states and is used because no site specific research is available.

2. Table A-15, p. A-52, shows that density and cover should increase by 14 percent when livestock use is reduced from moderate to light. The 14 percent is an overall average for the western states and is used because no site specific research is available.

Methods

The Pasture Capacity Level Alternative would affect 51 of 79 AMP allotments. These allotments have a proposed grazing system (rest rotation, scheduled rest-best, or rotational seasonal) which calls for one or more pastures to be rested by livestock for at least one year (Appendix 1, Figure A-6, p. A-17). The grazing system proposed for allotment 293 is a rest rotation, and would be affected by this alternative. This alternative does not affect allotments where deferred

TABLE A-14

VEGETATIVE PRODUCTION WHEN LIVESTOCK USE WAS REDUCED FROM MODERATE TO LIGHT

| Percent Change | Moderate Grazing (40-60% Use) (lbs./acre) | Light Grazing (20-40% Use) (lbs./acre) | Comments | Adapted From |
|---|---|---|---|---|
| 16 | 1,409 | 1,636 | Mid-grasses | Klipple and Bement (1961) |
| 48 | 1,454 | 2,157 | Mid-grasses | Klipple and Bement (1961) |
| 57* | 1,245 | 1,963 | Short grass | Klipple and Bement (1961) |
| 11 | 591 | 657 | Blue grama | Klipple and Bement (1961) |
| 99* | 122 | 243 | Mid-grasses | Klipple and Bement (1961) |
| 10 | 740 | 815 | Mid-grasses | Klipple and Bement (1961) |
| 0* | No difference in herbage production | | Mid-grasses | Klipple and Bement (1961) |
| 22 | .74 | .90 | Grams/Plant | Pond (1957) |
| 74* | 1.48 | 2.58 | Grams/Plant | Pond (1957) |
| 67* | 561 | 937 | | Hanson et al (1970) |
| 30 | 1,571 | 2,046 | | Johnson et al (1951) |
| 22 | 1,517 | 1,844 | | Johnson et al (1951) |
| 40 | 1,637 | 2,299 | | Johnson et al (1951) |
| 19 | 1,353 | 1,605 | | Lewis et al (1956) |
| 5 | 318 | 335 | | Smith, D. (1967) |
| 24 | 3,611 | 446 | | Smith, D. (1967) |

Average: 22

* Treated as outlyers

Source: References cited above

TABLE A-15

DENSITY AND COVER VALUES WHEN GRAZING IS REDUCED FROM MODERATE TO LIGHT USE

| Density and Cover % Change | Density and Cover: Moderate Grazing (40-60% Use) | Density and Cover: Light Grazing (20-40% Use) | Comments | Adapted From |
|---|---|---|---|---|
| -15* | 13.6 | 11.5 | Crown Cover % | Cook and Stoddart (1963) |
| -67* | 25.1 | 8.4 | Crown Cover % | Cook and Stoddart (1963) |
| 17 | 5.3 | 6.2 | Basal Area $CM^2$ | Pond (1957) |
| 47 | 6.8 | 10.0 | Basal Area $CM^2$ | Pond (1957) |
| 80* | 1,531.0 | 2,763.0 | Litter | Hanson et al (1970) |
| -14 | 2.8 | 2.4 | Blue grama /1 | Smoliak et al (1972) |
| 8 | 1.2 | 1.3 | Needle and Thread /1 | Smoliak et al (1972) |
| 42 | 1.2 | 1.7 | Western Wheatgrass /1 | Smoliak et al (1972) |
| 7 | 1.5 | 1.6 | Other grasses /1 | Smoliak et al (1972) |
| -38* | 0.8 | 0.5 | Sedge /1 | Smoliak et al (1972) |
| -22 | 0.9 | 0.7 | Forbs and Browse /1 | Smoliak et al (1972) |
| -28* | 22.6 | 18.7 | Club Moss /1 | Smoliak et al (1972) |
| 11 | 35.0 | 39.0 | Decreasers /2 | Johnson et al (1951) |
| - 7 | 61.0 | 57.0 | Increasers /2 | Johnson et al (1951) |
| 0 | 4.0 | 4.0 | Invaders /2 | Johnson et al (1951) |
| 81* | 311.0 | 562.0 | Standing dead /3 | Lewis et al (1956) |
| 116* | 371.0 | 801.0 | Mulch /3 | Lewis et al (1956) |
| 46 | 2,012.0 | 2,944.0 | Total Cover /3 | Lewis et al (1956) |

Average: 14

* Treated as outlyer

/1 Basal Area Percent
/2 Relative Cover Percent
/3 lbs./acre

Source: References cited above

rotational, rotational deferment, or continuous seasonal grazing systems have been proposed. It also does not affect the non-AMP allotments. This alternative ensures that utilization of any grazed pastures in the affected allotments does not exceed 50 percent. Average utilization of all pastures on the affected allotments would fall below 40 percent. A light utilization level would be attained on these allotments.

Vegetative Production

Grazing intensity studies show that mean annual vegetative production increases by 22 percent when grazing is reduced from moderate to light (Table A-14, p. A-52). Therefore, the AUMs expected under the Pasture Capacity Level would equal 22 percent of long-term Proposed Action AUMs as grazing is reduced from moderate to light, plus long-term Proposed Action AUMs.

= (.22) (Long-Term Proposed Action AUMs) + (Long-Term Proposed Action AUMs).

Example:

Allotment 293
Long-term Proposed Action AUMs = 8,286 (Table A-18, p. A-58)

Long-Term Pasture Capacity Level AUMs = (.22) (8,286) + 8,286
= 10,109 (Table A-18, p. A-58)

Density

Density and cover values were calculated for range sites by vegetative type and MLRA (Table 2-2). Each value is a weighted average for the total area of a range site by vegetative type and MLRA. The increases in density and cover under the Pasture Capacity Level Alternative would only occur on the allotments with rest rotation, rest best, and rotation seasonal grazing systems.

Grazing intensity studies show that mean density and cover increase by 14 percent when grazing is reduced from moderate to light (Table A-15, p. A-52). Therefore, the density and cover expected under the Pasture Capacity Level Alternative in the long term

= Long-Term Proposed Action Density + [(The expected increase in density as grazing goes from moderate to light) (Long-Term Proposed Action Density) (Acreage affected)]

Example:

For the Sandy Range Site, Desert Shrub Vegetative Type, SD-MLRA, Table 2-2

Long-term Proposed Action Density = .14 (Table 2-2)
Expected Increase in Density as Grazing Goes from Moderate to Light = .14 (Table A-15, p. A-52)
Total ES Acreage = 1,318,147 (Table 1-1)
Rest Rotation, Rest Best, and Rotational Seasonal Acreage = 1,060,534 (Table 1-1)

Long-Term Pasture Capacity Level Density = (.14) + [(.14)(.14)(1,060,534/1,318,147)]
= (.14) + (.14)(.14)(.80)
= .156 or 16 percent (Table 2-2)

Enhancement of Sensitive Resource Values Alternative

Assumptions

The Enhancement of Sensitive Resource Values Alternative would limit utilization of grazed pastures to 50 percent during any given year. Average utilization of all pastures on the affected allotments would fall below 40 percent. Additional livestock reductions would also be made on the basis of:

1. poor range condition, and/or critical or severe erosion condition;
2. riparian areas for wildlife habitat;
3. VRM Class I Areas (allotments: 006, 039, 052, 059, 077, and 086) and VRM Class II Areas (allotments: 129, 152, 277, and 293) (Table 1-6);
4. wild horse home range; and,
5. susceptibility of deep sand soil to erosion.

Methods

This alternative only changes the predictions for density and cover on AMP allotments. Predictions for density and cover on non-AMP allotments would remain the same as under the Proposed Action. This is a complex alternative. Parts of an affected allotment would be responding to the "No Grazing," "Pasture Capacity Level," and/or the "Proposed Action" treatment. It is assumed that all range sites within an affected allotment would respond similarly. Allotment 293 is affected by this alternative. The proposed grazing system for this allotment is a rest rotation and was affected by the Pasture Capacity Level Alternative. Under this alternative use would be eliminated from Pasture 3B to protect the Scenic Soaptree Yucca Area. A total deduction of 570 AUMs would result as shown on Table 1-6. Formula b) below was used to calculate the response allotment 293 is going to have to this alternative. The response to this alternative by other affected allotments would be calculated by one of the formulas shown below.

Vegetative Production

Production for those allotments affected by this alternative (the total vegetative AUMs) would be the additional response from the "No Grazing" acreage plus either the "Pasture Capacity Level" or the "Proposed Action" responses as shown below:

a) In allotments where grazing is eliminated, vegetative production response to No Grazing treatment in AUMs
$= C + (C).5$

b) In allotments affected by the Pasture Capacity Level Alternative and receiving additional reductions, vegetative production response to Pasture Capacity Level treatment in AUMs
$= [C + C(.5)] + [F + F(.22)]$

c) In allotments not affected by the Pasture Capacity Level Alternative but having reductions, vegetative production response to the Proposed Action treatment in AUMs
$= [C + C(.5)] + F$

Where

C = (Percent of Acreage Affected)(Long-Term Proposed Action AUMs - Range Survey AUMs)(Predicted Percentage Increase when Livestock Use is Reduced from Heavy to Moderate) + (Range Survey AUMs of the Affected Acreage)

.5 = Vegetative production increase expected when livestock grazing is reduced from moderate to No Grazing (Table A-11, p. A-50)

F = [(1)-(Percent of Acreage Affected)] (Long-Term Proposed Action AUMs - Range Survey AUMs) + (Range Survey AUMs) - (Range Survey AUMs of the Affected Acreage)

.22 = Vegetative production increase expected when livestock grazing is reduced from moderate to light

.74 = Predicted percentage increase when livestock use is reduced from heavy to moderate

Example:

Allotment 293 using the Pasture Capacity Level formula, b, above:

Range Survey AUMs = 6,267 (Table A-18, p. A-58)
Range Survey AUMs of Acreage Affected by "No Grazing" Treatment - 570 (Table 1-6)
Long-Term Proposed Action AUMs = 8,286 (Table A-18, p. A-58)
Percent of Acreage Affected = Acreage Pasture 3B divided by Total Acreage for the Allotment equals 3,462 divided by 42,901 equals 8%
Grazing System is a Rest-rotation

Long-Term Enhancement of Sensitive Resource Values AUMs = [C+C(.5)] + [F+F(.22)]

Where:

C = (.08)(8,286-6,267)(.74) + 570
= 689.5
F = (.92)(8,286-6,267) + (6,267-570)
= 7,554.5

Long-Term Enhancement of Sensitive Resource Values AUMs = [689.5 + 689.5(.5)] + [7,554.5 + 7,554.5(.22)]
= 1,034.25 + 9,216.49
= 10,250.74 or 10,251 (Table A-18, p. A-58)

Density

Because the differences are unmeasurable, density and cover values for this alternative are the same as those calculated for the Pasture Capacity Level Alternative (Table 2-2).

No Grazing Alternative

Assumptions

Three assumptions are needed before the No Grazing Alternative can be analyzed: 1) This alternative would eliminate all livestock grazing on public lands; 2) The vegetal response predicted in the Proposed Action is equally distributed over the "treatment area" regardless of range site patterns; and 3) Livestock use on non-public land would not be changed from existing grazing preference. Vegetative production is expected to increase by 50 percent when livestock grazing is reduced from moderate to non-use (Table A-11, p. A-50). Density and cover would increase by 24 percent if the site were completely protected from livestock grazing (Table A-17, p. A-57). The 50- and 24-percent figures are overall averages for the western states and are used because no site specific research is available. There would be a 125-percent increase in vegetative production when livestock use is reduced from heavy to no grazing.

Methods

The predicted increase would only occur on public acreage; no change is predicted for non-public acreage. Allotment 293 is used as an example for calculating vegetative responses under the No Grazing Alternative.

Vegetative Production

The vegetative AUMs expected under the No Grazing Alternative in the long term is shown below:

Total AUMs = (Range Survey Non-Public Land AUMs) + (Public Land Livestock Adjustment AUMs) (Expected Increase in Production when Use is Reduced from Moderate to None) + (Public Land Livestock Adjustment AUMs).

Where

Public Land Livestock Adjustment AUMs = (Percent Public Acreage)(Long-Term Proposed Action AUMs - Range Survey AUMs) (Predicted Percentage Increase Due to Livestock Use Being Reduced from Heavy to Moderate) + (Range Survey, Public Land AUMs).

.74 = The predicted percentage increase due to livestock use being reduced from heavy to moderate.

.50 = The expected increase in production when use is reduced from moderate to none.

For example:

| | | |
|---|---|---|
| Range Survey AUMs | = 6,267 | (Table A-18, p. A-58) |
| Range Survey Public Land AUMs | = 5,431 | (Figure A-4, p. A-14) |
| Range Survey Non-Public Land AUMs | = 836 | (Figure A-4, p. A-14) |
| Total Acreage | = 42,901 | (Table A-1, p. A-4) |
| Public Acreage | = 37,425 | (Table A-1, p. A-4) |
| Long-Term Proposed Action AUMs | = 8,286 | (Table A-18, p. A-58) |

Public Land Livestock Adjustment AUMs = 37,425/42,901 (8,286 - 6,267) (.74) + 5,431
= 6,730.83

Total AUM Production = 836 + (6,730.83) (.5) + 6,730.83
= 10,932 (Table A-18, p. A-58)

Density

Density and cover values were calculated for range sites by vegetative type and MLRA (Table 2-2). The increases in density and cover under the No Grazing Alternative would only occur on the public land. However the figure shown (Table 2-2) is a weighted average of public and non-public land by range site, vegetative type, and MLRA.

Grazing intensity studies show that mean density and cover increases 24 percent when grazing is reduced from moderate to non-use (Table A-17, p. A-57); therefore, the density and cover expected under the No Grazing Alternative in the long term

= (Percent Public Land) [Long-Term Livestock Adjustment Alternative Density + .24 (Long-Term Livestock Adjustment Alternative Density)] + (Percent Non-Public Lands)(Range Survey Density)

Example:

Sandy Range Site, Desert Shrub Vegetative Type, SD-MLRA (Table 2-2).

Public Land in Range Site = 27,937 (Table 2-2)
Total Land in Range Site = 41,298 (Table 2-2)
Long-Term Density Livestock Adjustment Alternative = .1313 (Table 2-2)
Range Survey Density = .11 (Table 2-2)
No Grazing Density = (27,937/41,298) [.1313 + .24(.1313)] + (1 - 27,937/41,298)(.11)
= .1457 or .15 (Table 2-2)

TABLE A-16

VEGETATIVE PRODUCTION WHEN LIVESTOCK ARE REMOVED FROM A PREVIOUSLY MODERATELY GRAZED RANGE

| Percent Change | Vegetative Production (lbs./ac.) Moderate Grazing | No Grazing | Comments | Adapted From |
|---|---|---|---|---|
| -9* | 1,149.00 | 1,041.00 | Texas | Reardon and Merrill (1976) |
| 180* | 0.74** | 2.07** | Wyoming | Pond (1957) |
| 41 | 1.48** | 2.09** | Wyoming | Pond (1957) |
| 19 | 470.00 | 560.00 | Stony Hills | Pieper (1968) |
| 18 | 550.00 | 650.00 | Loamy Upland | Pieper (1968) |
| 107 | 295.00 | 610.00 | Loamy Bottomland | Pieper (1968) |
| 44 | 287.00 | 413.00 | Arizona | Schmutz, Michaels, and Judd (1967) |
| -13* | 3,239.00 | 2,828.00 | Central Louisiana | Duvall and Linnartz (1967) |
| -17* | 400.00 | 331.00 | Open Grassland | Smith (1967) |
| -2 | 337.00 | 331.00 | Open Timber | Smith (1967) |
| 115 | 20.00** | 43.00** | Utah | Julander (1968) |
| 38 | 33.00** | 52.00** | Utah | Julander (1968) |
| 33 | 21.00** | 28.00** | Utah | Julander (1968) |
| 38 | 1,117.00 | 1,622.00 | Colorado | Schwan et al (1949) |

Average: 50

*Treated as outlyers

**Grams per plant

Source: References cited above.

TABLE A-17

DENSITY AND COVER VALUES WHEN LIVESTOCK ARE REMOVED FROM A PREVIOUSLY MODERATELY GRAZED RANGE

| Percent Change | Density and Cover (Percent) Moderate Grazing | No Grazing | Comments | Adapted From |
|---|---|---|---|---|
| 27 | 44.5 | 56.5 | Wyoming | Pond (1961) |
| 22 | 4.5 | 5.5 | Wyoming | Pond (1961) |
| -8 | 77.0 | 71.0 | Wyoming | Pond (1961) |
| 36 | 11.0 | 15.0 | Wyoming | Pond (1961) |
| 10 | 75.5 | 83.2 | Wyoming | Pond (1961) |
| 57 | 7.5 | 11.8 | Wyoming | Pond (1961) |
| -43* | 10.5 | 6.0 | Wyoming | Marquiss and Lang (1969) |
| -31* | 7.0 | 4.8 | Wyoming | Marquiss and Lang (1969) |
| 9 | 21.5 | 23.5 | Arizona | Schmutz, Michaels, and Judd (1967) |
| -150* | -8.0 | -20.0 | Ground Cover Live Veg. | Duvall and Linnartz (1967) |
| 100 | -9.0 | 0 | Ground Cover Index | Turner (1971) |
| 25 | 18.8 | 23.5 | Mesa | Canfield (1948) |
| 27 | 14.6 | 18.5 | Foothill | Canfield (1948) |
| 54 | 7.2 | 11.1 | New Mexico | Potter and Krenetsky (1967) |
| -45* | 26.4 | 14.4 | Ridgeline | Tomanek and Albertson (1951) |
| -58* | 33.0 | 14.0 | Hillside | Tomanek and Albertson (1951) |
| -12 | 62.6 | 55.2 | Stony Hill | Pieper (1968) |
| -5 | 78.1 | 74.4 | Loamy Bottomland | Pieper (1968) |
| -2 | 72.4 | 71.3 | Loamy Upland | Pieper (1968) |

Average: 24

*Treated as outlyers

Source: References cited above.

TABLE A-18

VEGETATIVE AUMs IN THE LONG TERM

| Allot. No. | Range Survey EE | PA | NA/FE | LA | PCL | ESR | NG | P*** |
|---|---|---|---|---|---|---|---|---|
| AMPs | | | | | | | | |
| 002 | 3,081 | 3,561 | 3,081 | 3,436 | 4,344 | 4,378 | 3,703 | 12,491 |
| 006 | 1,584 | 2,173 | 1,584 | 2,020 | 2,651 | 2,651 | 2,770 | 5,062 |
| 012 | 197 | 231 | 197 | 222 | 231 | 231 | 287 | 959 |
| 016 | 3,117 | 4,459 | 3,117 | 4,110 | 5,440 | 5,457 | 4,595 | 9,855 |
| 036 | 877 | 1,029 | 1,029 | 1,029 | 1,255 | 1,289 | 1,478 | 1,671 |
| 037 | 1,414 | 1,632 | 1,414 | 1,575 | 1,991 | 1,991 | 2,211 | 5,394 |
| 052 | 117 | 263 | 117 | 225 | 263 | 263 | 492 | 570 |
| 058 | 550 | 630 | 630 | 630 | 630 | 630 | 837 | 1,762 |
| 059 | 2,020 | 5,032 | 5,032 | 5,032 | 6,139 | 6,139 | 4,829 | 16,461 |
| 065 | 3,003 | 3,505 | 3,505 | 3,505 | 4,276 | 4,276 | 3,744 | 10,711 |
| 077 | 247 | 281 | 281 | 281 | 343 | 364 | 352 | 1,432 |
| 081 | 795 | 1,040 | 1,040 | 1,040 | 1,269 | 1,269 | 1,431 | 1,115 |
| 083 | 67 | 67 | 67 | 67 | 67 | 67 | 101 | 226 |
| 086 | 2,774 | 3,683 | 2,774 | 3,447 | 4,493 | 4,493 | 4,440 | 11,632 |
| 089 | 45 | 59 | 45 | 55 | 59 | 59 | 64 | 294 |
| 090 | 1,210 | 1,805 | 1,210 | 1,650 | 2,202 | 2,235 | 2,045 | 5,746 |
| 091 | 490 | 686 | 686 | 686 | 837 | 837 | 948 | 1,054 |
| 114 | 5,346 | 6,710 | 5,346 | 6,355 | 8,186 | 8,196 | 6,853 | 16,619 |
| 121 | 812 | 1,250 | 1,250 | 1,250 | 1,250 | 1,250 | 1,510 | 3,687 |
| 122 | 367 | 454 | 454 | 454 | 454 | 540 | 513 | 720 |
| 129 | 7,299 | 9,719 | 9,719 | 9,719 | 11,857 | 12,399 | 10,340 | 27,051 |
| 131 | 872 | 1,268 | 872 | 1,165 | 1,547 | 1,547 | 1,143 | 3,724 |
| 152 | 3,019 | 4,152 | 3,019 | 3,857 | 5,065 | 5,065 | 4,015 | 11,401 |
| 250 | 714 | 783 | 714 | 765 | 955 | 1,035 | 1,026 | 1,518 |
| 251 | 2,517 | 3,866 | 2,517 | 3,515 | 4,717 | 4,717 | 3,702 | 5,901 |
| 252 | 1,901 | 2,659 | 1,901 | 2,462 | 3,244 | 3,248 | 3,388 | 3,659 |
| 253 | 238 | 388 | 388 | 388 | 388 | 424 | 524 | 587 |
| 254 | 2,504 | 3,217 | 3,217 | 3,217 | 3,217 | 4,305 | 4,200 | 4,098 |
| 255 | 319 | 435 | 435 | 435 | 435 | 653 | 541 | 925 |
| 256 | 1,576 | 2,129 | 2,129 | 2,129 | 2,597 | 2,605 | 2,697 | 5,412 |
| 258 | 1,009 | 1,241 | 1,009 | 1,241 | 1,514 | 1,659 | 1,657 | 1,814 |
| 260 | 1,823 | 2,780 | 1,823 | 2,531 | 3,392 | 3,447 | 3,165 | 3,165 |
| 261 | 2,235 | 2,430 | 2,430 | 2,430 | 2,965 | 3,441 | 3,089 | 2,433 |
| 262 | 2,313 | 2,992 | 2,313 | 2,815 | 3,650 | 3,810 | 3,325 | 3,557 |
| 263 | 2,564 | 3,313 | 2,564 | 3,118 | 3,313 | 3,313 | 3,895 | 8,084 |
| 264 | 1,389 | 1,809 | 1,389 | 1,700 | 1,809 | 1,896 | 2,318 | 1,953 |
| 266 | 1,397 | 2,085 | 1,397 | 1,906 | 2,544 | 2,544 | 2,625 | 2,097 |
| 268 | 4,434 | 8,564 | 4,434 | 7,490 | 10,448 | 10,465 | 9,399 | 17,674 |
| 271 | 2,955 | 3,555 | 2,955 | 3,399 | 4,337 | 4,337 | 4,177 | 6,210 |
| 272 | 4,259 | 5,228 | 4,259 | 4,976 | 6,378 | 6,378 | 6,823 | 4,080 |
| 275 | 8,163 | 11,773 | 8,163 | 10,834 | 14,363 | 14,491 | 11,722 | 25,884 |
| 276 | 324 | 452 | 324 | 419 | 452 | 452 | 559 | 594 |
| 277 | 1,896 | 2,364 | 1,896 | 2,242 | 2,884 | 3,179 | 2,821 | 2,283 |
| 279 | 1,500 | 1,598 | 1,598 | 1,598 | 1,950 | 2,012 | 2,050 | 1,940 |
| 280 | 1,857 | 3,078 | 1,857 | 2,761 | 3,755 | 3,755 | 3,570 | 3,240 |
| 283 | 2,319 | 2,851 | 2,851 | 2,851 | 3,478 | 3,478 | 3,562 | 3,842 |
| 284 | 1,158 | 1,563 | 1,158 | 1,458 | 1,907 | 1,907 | 1,934 | 3,651 |
| 285 | 2,753 | 3,831 | 2,753 | 3,551 | 3,831 | 4,482 | 4,760 | 5,132 |
| 287 | 307 | 458 | 458 | 458 | 559 | 569 | 577 | 684 |
| 288 | 275 | 313 | 313 | 313 | 382 | 421 | 428 | 510 |
| 289 | 1,601 | 2,552 | 2,552 | 2,552 | 3,113 | 3,113 | 2,996 | 4,457 |
| 290 | 2,564 | 3,760 | 2,564 | 3,449 | 3,760 | 3,760 | 5,316 | 7,632 |
| 291 | 1,253 | 1,950 | 1,253 | 1,769 | 2,379 | 2,379 | 2,521 | 2,112 |
| 293 | 6,267 | 8,286 | 6,267 | 7,761 | 10,109 | 10,251 | 10,932 | 9,189 |
| 294 | 1,411 | 1,530 | 1,411 | 1,499 | 1,530 | 1,870 | 1,644 | 3,780 |
| 295 | 1,672 | 1,861 | 1,672 | 1,812 | 1,861 | 1,861 | 2,101 | 4,084 |
| 297 | 878 | 1,647 | 1,647 | 1,647 | 2,009 | 2,021 | 1,809 | 3,994 |
| 298 | 831 | 1,177 | 831 | 1,087 | 1,436 | 1,436 | 1,149 | 1,945 |
| 299 | 686 | 776 | 686 | 753 | 947 | 947 | 1,076 | 1,128 |
| 300 | 782 | 1,042 | 1,042 | 1,042 | 1,271 | 1,271 | 1,080 | 763 |
| 301 | 3,924 | 5,682 | 3,924 | 5,225 | 6,932 | 6,932 | 6,076 | 10,032 |
| 303 | 80 | 127 | 80 | 115 | 127 | 127 | 173 | 157 |
| 306 | 326 | 342 | 326 | 338 | 342 | 342 | 476 | 554 |
| 308 | 193 | 227 | 193 | 218 | 277 | 299 | 310 | 492 |
| 312 | 426 | 667 | 667 | 667 | 814 | 907 | 907 | 1,691 |
| 315 | 280 | 629 | 280 | 538 | 629 | 807 | 707 | 711 |
| 317 | 212 | 273 | 273 | 273 | 273 | 386 | 361 | 443 |
| 318 | 340 | 392 | 392 | 392 | 478 | 490 | 551 | 562 |
| 321 | 965 | 1,470 | 965 | 1,339 | 1,793 | 1,793 | 1,726 | 4,396 |
| 322 | 2,363 | 3,023 | 2,363 | 2,851 | 3,688 | 3,774 | 3,550 | 2,951 |
| 323 | 2,261 | 3,135 | 2,261 | 2,908 | 3,135 | 3,180 | 3,349 | 5,916 |
| 325 | 1,687 | 2,386 | 1,687 | 2,204 | 2,911 | 2,918 | 2,697 | 4,946 |
| 327 | 1,111 | 1,614 | 1,111 | 1,483 | 1,969 | 1,989 | 1,646 | 2,569 |

TABLE A-18 (continued)

VEGETATIVE AUMs IN THE LONG TERM

| Allot. No. | Range Survey EE | PA | NA/FE | LA | PCL | ESR | NG | P*** |
|---|---|---|---|---|---|---|---|---|
| AMPs (continued) | | | | | | | | |
| 328 | 1,062 | 1,794 | 1,062 | 1,604 | 1,794 | 1,794 | 1,976 | 3,620 |
| 330 | 1,020 | 1,484 | 1,020 | 1,363 | 1,484 | 1,484 | 1,413 | 2,119 |
| 347 | 23 | 41 | 23 | 36 | 41 | 41 | 48 | 67 |
| 348 | 160 | 308 | 160 | 270 | 308 | 308 | 388 | 522 |
| 349 | 89 | 208 | 89 | 177 | 208 | 208 | 266 | 227 |
| 360 | 650 | 781 | 650 | 747 | 781 | 781 | 932 | 979 |
| TOTAL | 129,119 | 178,608 | 141,165 | 168,931 | 210,712 | 216,118 | 205,411 | 345,733 |
| (Percent Increase) | | (38%) | (9%) | (31%) | (63%) | (67%) | (59%) | |
| NON-AMPs | | | | | | | | |
| 017 | 264 | * | * | * | * | * | 594 | 909 |
| 113 | 19 | * | * | * | * | 43 | 43 | 57 |
| 134 | 79 | * | * | * | * | * | 178 | 476 |
| 143 | 13 | * | * | * | * | * | 29 | 72 |
| 145 | 347 | * | * | * | * | * | 781 | 1,835 |
| 165 | 9 | * | * | * | * | * | 20 | 37 |
| 267 | 342 | * | * | * | * | * | 770 | 920 |
| 281 | 942 | * | * | * | * | * | 2,120 | 2,250 |
| 282 | 54 | * | * | * | * | * | 122 | 216 |
| 296 | 866 | * | * | * | * | * | 1,299 | 1,050 |
| 310 | 152 | * | * | * | * | * | 342 | 394 |
| 340 | 262 | * | * | * | * | * | 393 | 495 |
| 341 | 11 | * | * | * | * | * | 17 | 23 |
| 342 | 234 | * | * | * | * | * | 351 | 363 |
| 343 | 154 | * | * | * | * | * | 347 | 424 |
| 345 | 144 | * | * | * | * | * | 324 | 386 |
| 350 | 225 | * | * | * | * | * | 338 | 268 |
| 351 | 155 | * | * | * | * | * | 349 | 644 |
| 352 | 452 | * | * | * | * | * | 678 | 871 |
| 353 | 140 | * | * | * | * | * | 315 | 341 |
| 354 | 13 | * | * | * | * | * | 29 | 32 |
| 355 | 450 | * | * | * | * | * | 675 | 685 |
| 356 | 86 | * | * | * | * | * | 129 | 175 |
| 358 | 322 | * | * | * | * | * | 483 | 637 |
| 361 | 35 | * | * | * | * | * | 79 | 192 |
| 362 | 8 | * | * | * | * | | 18 | 37 |
| TOTAL | 5,778 | * | * | * | * | 5,802 | 10,823 | 13,789 |
| ELIMINATION OF GRAZING | | | | | | | | |
| 286 | 2 | 5 | * | ** | ** | ** | ** | 33 |
| 302 | 1 | 2 | * | ** | ** | ** | ** | 33 |
| 311 | 1 | 2 | * | ** | ** | ** | ** | 7 |
| 357 | 38 | 86 | * | ** | ** | ** | ** | 283 |
| TOTAL | 42 | 95 | * | ** | ** | ** | ** | 356 |
| UNALLOTTED AREAS | | | | | | | | |
| 164 | 3 | 7 | * | ** | ** | ** | ** | 46 |
| 363 | 0 | 0 | * | ** | ** | ** | ** | 0 |
| TOTAL | 3 | 7 | * | ** | ** | ** | ** | 46 |
| TOTAL FOR ES AREA | | | | | | | | |
| | 134,942 | 184,488 | 146,988 | 174,811 | 216,592 | 221,920 | 216,336 | 359,924 |
| (Percent Increase) | | (37%) | (9%) | (30%) | (61%) | (64%) | (60%) | (167%) |

* Same as Existing Environment ** Same as Proposed Action

EE - Existing Environment
NA/FE - No Action Alternative and Future Environment
PA - Proposed Action
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative
***P - Potential (The Ultimate Production Ever Expected)

Source: Range Survey, Socorro County Soil Survey and Vegetation Methodologies, Socorro District

# APPENDIX 3

SOILS


| | Page |
|---|---|
| Table A-19 Soils and Range Sites by Allotment | A-60 |
| Methodology for Determining Wind Erodibility Groups (WEGs) | A-72 |
| PSIAC Method for Calculating Sediment Yield | A-73 |
| Methodology for Calculating Sediment Yield | A-74 |
| Table A-20 Percent Cover and PSIAC Factor Rating for Cover* for Soil Erosion Calculations by Range Site | A-75 |
| Figure A-8 An Example of Factors Affecting a High, Moderate, and Low Sediment Yield in the Pacific Southwest | A-76 |
| An Example of PSIAC Sediment Yield Calculation for Bluepoint Sand | A-77 |
| Table A-21 PSIAC Conversion Factors | A-77 |

TABLE A-19

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 002 | Deep Sand SD | | | |
| | 620 | 4,003 | 8,667 | 12,670 |
| | Gravelly WP-3 | | | |
| | 441 | 637 | 1,319 | 1,956 |
| | Hills CP | | | |
| | 785 | 976 | 1,642 | 2,618 |
| | Igneous Hills SO | | | |
| | 689 | 597 | 1,296 | 1,893 |
| | Limestone Hills WP-2,3 | | | |
| | 432 | 25 | 640 | 665 |
| | 482 | 128 | 793 | 921 |
| | Loamy WP-2,3 | | | |
| | 418 | 505 | 1,770 | 2,275 |
| | 419 | 2,084 | 4,953 | 7,037 |
| | 431 | 310 | 661 | 971 |
| | 446 | 72 | 94 | 166 |
| | SO | | | |
| | 648 | 160 | 484 | 644 |
| | 653 | 209 | 409 | 618 |
| | Malpais WP-2 | | | |
| | 405 | 1,335 | 1,886 | 3,221 |
| | SO | | | |
| | 657 | 391 | 722 | 1,113 |
| | Sandstone Hills WP-2 | | | |
| | 483 | 1,677 | 3,603 | 5,280 |
| | Sandy WP-2 | | | |
| | 455 | 41 | 210 | 251 |
| | WP-3 | | | |
| | 422 | 50 | 320 | 370 |
| | SO | | | |
| | 624 | 282 | 1,201 | 1,483 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 45 | 1,577 | 1,622 |
| | No Range Site | | | |
| | 485 | 1,043 | 1,697 | 2,740 |
| 006 | Gravelly WP-3 | | | |
| | 440 | 393 | 0 | 393 |
| | 449 | 798 | 377 | 1,175 |
| | Hills CP | | | |
| | 785 | 230 | 4 | 234 |
| | Limestone Hills WP-2 | | | |
| | 482 | 1,967 | 322 | 2,289 |
| | WP-3 | | | |
| | 432 | 3,443 | 674 | 4,117 |
| | CP | | | |
| | 781 | 231 | 21 | 252 |
| | Loamy WP-3 | | | |
| | 419 | 411 | 275 | 686 |
| | 446 | 2,410 | 309 | 2,719 |
| | Shallow WP-3 | | | |
| | 439 | 197 | 61 | 258 |
| | 490 | 760 | 0 | 760 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 396 | 380 | 776 |
| 012 | Hills CP | | | |
| | 785 | 185 | 436 | 621 |
| | Limestone Hills WP-2 | | | |
| | 482 | 682 | 96 | 778 |
| | Shallow WP-3 | | | |
| | 484 | 679 | 338 | 1,017 |
| | No Range Site | | | |
| | 485 | 20 | 0 | 20 |
| | 491 | 205 | 34 | 239 |
| 016 | Bottomland WP-2 | | | |
| | 421 | 317 | 676 | 993 |
| | Gypsum Hills CP | | | |
| | 787 | 273 | 1,014 | 1,287 |
| | Hills CP | | | |
| | 785 | 745 | 707 | 1,452 |
| | Limestone Hills WP-2 | | | |
| | 482 | 2,113 | 3,074 | 5,187 |
| | WP-3 | | | |
| | 432 | 1,042 | 1,130 | 2,172 |
| | Loamy WP-3 | | | |
| | 418 | 922 | 600 | 1,522 |
| | 419 | 4,255 | 2,740 | 6,995 |
| | Sandy WP-3 | | | |
| | (No Name) | 244 | 333 | 577 |
| | Shallow WP-3 | | | |
| | 484 | 923 | 677 | 1,600 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 1,441 | 1,804 | 3,245 |
| | No Range Site | | | |
| | 491 | 511 | 1,546 | 2,057 |
| 036 | Gravelly SO | | | |
| | 652 | 6,240 | 24 | 6,264 |
| | Loamy SO | | | |
| | 641 | 979 | 0 | 979 |
| | 648 | 3,082 | 112 | 3,194 |
| | Sandy SO | | | |
| | 637 | 556 | 0 | 556 |
| | No Range Site | | | |
| | 491 | 1,102 | 1 | 1,103 |
| 037 | Gravelly WP-3 | | | |
| | 440 | 376 | 211 | 587 |
| | 441 | 416 | 239 | 655 |
| | 449 | 1,231 | 510 | 1,741 |
| | SD | | | |
| | 652 | 411 | 1 | 412 |
| | Hills CP | | | |
| | 785 | 2,355 | 443 | 2,798 |
| | Loamy WP-3 | | | |
| | 410 | 1,329 | 369 | 1,698 |
| | 446 | 2,040 | 0 | 2,040 |
| | SO | | | |
| | 625 | 938 | 143 | 1,081 |
| | 641 | 1,243 | 0 | 1,243 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 037 (cont.) | Shallow WP-3 490 | 1,083 | 133 | 1,216 |
| | No Range Site 800 | 241 | 152 | 393 |
| 052 | Hills CP 785 | 804 | 686 | 1,490 |
| | Limestone Hills WP-2 482 | 571 | 0 | 571 |
| 058 | Gravelly WP-3 441 | 682 | 293 | 975 |
| | 449 | 736 | 0 | 736 |
| | SO 652 | 153 | 0 | 153 |
| | Loamy WP-3 410 | 111 | 0 | 111 |
| | SO 625 | 1,654 | 665 | 2,319 |
| | Sandy SO 624 | 254 | 0 | 254 |
| 059 | Bottomland WP-2 421 | 524 | 303 | 827 |
| | Gravelly WP-3 441 | 8,622 | 6,517 | 15,139 |
| | 449 | 1,179 | 123 | 1,302 |
| | Hills CP 785 | 3,303 | 512 | 3,815 |
| | Limestone Hills WP-2 482 | 1,908 | 205 | 2,113 |
| | Loamy WP-3 410 | 83 | 551 | 634 |
| | 445 | 0 | 751 | 751 |
| | Shallow WP-3 439 | 321 | 0 | 321 |
| | 484 | 1,700 | 347 | 2,047 |
| | No Range Site 491 | 389 | 353 | 742 |
| 065 | Basalt Hills WP-2 484 | 130 | 140 | 270 |
| | Bottomland WP-2 420 | 92 | 337 | 429 |
| | Gravelly WP-3 441 | 0 | 348 | 348 |
| | Limestone Hills WP-2 432 | 901 | 2,376 | 3,277 |
| | 482 | 281 | 540 | 821 |
| | Loamy WP-2,3 418 | 437 | 252 | 689 |
| | 419 | 652 | 1,624 | 2,276 |
| | 446 | 1,788 | 3,485 | 5,273 |
| | Malpais WP-2 405 | 2,105 | 3,648 | 5,753 |
| | 406 | 1,432 | 2,933 | 4,365 |
| 065 (cont.) | Sandstone Hills WP-2 483 | 397 | 239 | 636 |
| | Shallow Sandstone WP-2 434 | 2,582 | 3,128 | 5,710 |
| | No Range Site 485 | 1,107 | 2,053 | 3,160 |
| 077 | Gravelly WP-3 441 | 502 | 174 | 676 |
| | 449 | 154 | 0 | 154 |
| | SO 652 | 140 | 539 | 679 |
| | Hills CP 785 | 1,539 | 1,051 | 2,590 |
| | No Range Site 800 | 1,881 | 460 | 2,341 |
| 081 | Gravelly WP-3 449 | 70 | 80 | 150 |
| | SO 652 | 2,427 | 109 | 2,536 |
| | Loamy SO 625 | 1,648 | 61 | 1,709 |
| | 641 | 1,415 | 0 | 1,415 |
| | Sandy SO 624 | 148 | 0 | 148 |
| | No Range Site 491 | 160 | 0 | 160 |
| 083 | Loamy WP-2 419 | 164 | 0 | 164 |
| | Sandy WP-2 422 | 195 | 0 | 195 |
| | 455 | 275 | 0 | 275 |
| 086 | Gravelly WP-3 440 | 1,864 | 71 | 1,935 |
| | 449 | 3,614 | 235 | 3,849 |
| | Hills CP 785 | 2,215 | 147 | 2,362 |
| | Limestone Hills WP-2 482 | 5,450 | 506 | 5,956 |
| | WP-3 432 | 1,386 | 1,382 | 2,768 |
| | CP 732 | 87 | 489 | 576 |
| | 781 | 137 | 0 | 137 |
| | Loamy WP-3 410 | 1,476 | 53 | 1,529 |
| | 418 | 519 | 378 | 897 |
| | Shallow WP-3 431 | 1,685 | 45 | 1,730 |
| | 439 | 3,601 | 569 | 4,170 |
| | 484 | 1,158 | 0 | 1,158 |
| | Shallow Sandstone WP-2 434 | 104 | 89 | 193 |
| | No Range Site 800 | 186 | 0 | 186 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 089 | Sandy WP-3 | | | |
| | 455 | 269 | 220 | 489 |
| 090 | Bottomland WP-3 | | | |
| | 420 | 112 | 237 | 349 |
| | Gravelly WP-3 | | | |
| | 441 | 797 | 0 | 797 |
| | Loamy WP-2,3 | | | |
| | 419 | 3,851 | 2,035 | 5,886 |
| | Malpais WP-2 | | | |
| | 405 | 250 | 312 | 562 |
| | 406 | 715 | 791 | 1,506 |
| | Sandstone Hills WP-2 | | | |
| | 483 | 180 | 10 | 190 |
| | Sandy WP-2,3 | | | |
| | 422 | 0 | 147 | 147 |
| | 455 | 3,109 | 1,208 | 4,317 |
| 091 | Gravelly WP-3 | | | |
| | 441 | 131 | 0 | 131 |
| | SD | | | |
| | 652 | 4,341 | 42 | 4,383 |
| | Loamy SD | | | |
| | 641 | 2,342 | 24 | 2,366 |
| | No Range Site | | | |
| | 491 | 486 | 14 | 500 |
| 114 | Basalt Hills WP-2 | | | |
| | 484 | 761 | 1,596 | 2,357 |
| | Bottomland WP-2 | | | |
| | 420 | 326 | 709 | 1,035 |
| | Limestone Hills WP-2 | | | |
| | 432 | 478 | 726 | 1,204 |
| | 482 | 411 | 819 | 1,230 |
| | Loamy WP-2 | | | |
| | 410 | 34 | 173 | 207 |
| | 418 | 55 | 140 | 195 |
| | 419 | 1,509 | 4,254 | 5,763 |
| | 446 | 1,963 | 2,279 | 4,242 |
| | Malpais WP-2 | | | |
| | 405 | 4,509 | 7,000 | 11,509 |
| | 406 | 4,534 | 5,945 | 10,479 |
| | Sandstone Hills WP-2 | | | |
| | 482 | 108 | 526 | 634 |
| | Sandy WP-2 | | | |
| | 455 | 80 | 324 | 404 |
| | Shallow WP-2 | | | |
| | 431 | 282 | 969 | 1,251 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 254 | 330 | 584 |
| | No Range Site | | | |
| | 485 | 1,615 | 3,615 | 5,230 |
| 121 | Gypsum Hills CP | | | |
| | 787 | 512 | 105 | 617 |
| 121 (cont.) | Hills CP | | | |
| | 785 | 512 | 0 | 512 |
| | Limestone Hills WP-2 | | | |
| | 482 | 3,363 | 144 | 3,507 |
| | Shallow WP-3 | | | |
| | 431 | 109 | 0 | 109 |
| | 484 | 2,874 | 1,727 | 4,601 |
| | No Range Site | | | |
| | 491 | 137 | 145 | 282 |
| 122 | Gravelly SD | | | |
| | 652 | 2,116 | 636 | 2,752 |
| | Loamy SD | | | |
| | 648 | 181 | 0 | 181 |
| | No Range Site | | | |
| | 491 | 103 | 9 | 112 |
| 129 | Basalt Hills WP-2 | | | |
| | 484 | 879 | 502 | 1,381 |
| | Bottomland WP-2,3 | | | |
| | 420 | 1,326 | 1,501 | 2,827 |
| | Gypsum Flats WP-2 | | | |
| | 476 | 107 | 222 | 329 |
| | Loamy WP-2,3 | | | |
| | 410 | 324 | 513 | 837 |
| | 419 | 9,179 | 11,317 | 20,496 |
| | Malpais WP-2 | | | |
| | 405 | 2,037 | 1,405 | 3,442 |
| | 406 | 11,527 | 13,446 | 24,973 |
| | Sandstone Hills WP-2 | | | |
| | 483 | 2,410 | 295 | 2,705 |
| | Sandy WP-2,3 | | | |
| | 422 | 34 | 77 | 111 |
| | 455 | 2,098 | 6,251 | 8,349 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 0 | 107 | 107 |
| | No Range Site | | | |
| | 485 | 4,629 | 2,143 | 6,772 |
| 131 | Limestone Hills WP-2 | | | |
| | 432 | 883 | 1,638 | 2,521 |
| | 482 | 152 | 118 | 270 |
| | Loamy WP-2,3 | | | |
| | 418 | 1,343 | 2,064 | 3,407 |
| | 419 | 333 | 2,476 | 2,809 |
| | 446 | 430 | 690 | 1,120 |
| | Sandstone Hills WP-2 | | | |
| | 483 | 213 | 101 | 314 |
| | Shallow WP-2 | | | |
| | 431 | 0 | 301 | 301 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 25 | 160 | 185 |
| 152 | Basalt Hills WP-2 | | | |
| | 484 | 727 | 667 | 1,394 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 152 (cont.) | Bottomland WP-2 | | | |
| | 420 | 256 | 743 | 999 |
| | Limestone Hills WP-2 | | | |
| | 432 | 1,550 | 1,532 | 3,082 |
| | 482 | 153 | 152 | 305 |
| | Loamy WP-2 | | | |
| | 419 | 1,308 | 4,589 | 5,897 |
| | 446 | 129 | 22 | 151 |
| | Malpais WP-2 | | | |
| | 405 | 650 | 1,626 | 2,276 |
| | 406 | 5,019 | 6,074 | 11,093 |
| | Sandstone Hills WP-2 | | | |
| | 483 | 128 | 428 | 556 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 701 | 2,174 | 2,875 |
| | No Range Site | | | |
| | 485 | 876 | 2,497 | 3,373 |
| 250 | Gravelly SD | | | |
| | 622 | 383 | 0 | 383 |
| | 649 | 5,495 | 1,370 | 6,865 |
| | 652 | 4,210 | 1,210 | 5,420 |
| | 655 | 2,517 | 960 | 3,477 |
| | No Range Site | | | |
| | 491 | 344 | 1,409 | 1,753 |
| 251 | Bottomland CP | | | |
| | 724 | 614 | 999 | 1,613 |
| | Limestone Hills CP | | | |
| | 723 | 0 | 139 | 139 |
| | 731 | 585 | 426 | 1,011 |
| | 732 | 299 | 463 | 762 |
| | Loamy SD | | | |
| | 636 | 297 | 875 | 1,172 |
| | 641 | 456 | 0 | 456 |
| | CP | | | |
| | 710 | 93 | 935 | 1,028 |
| | 735 | 1,159 | 1,573 | 2,732 |
| | 737 | 123 | 692 | 815 |
| | Sandy SD | | | |
| | 624 | 0 | 206 | 206 |
| | 627 | 1,405 | 405 | 1,810 |
| | CP | | | |
| | 717 | 1,052 | 1,736 | 2,788 |
| | 752 | 521 | 558 | 1,079 |
| | 756 | 480 | 218 | 698 |
| | Shallow CP | | | |
| | 783 | 58 | 50 | 108 |
| 252 | Bottomland SD | | | |
| | 651 | 241 | 0 | 241 |
| | Gravelly SD | | | |
| | 649 | 2,002 | 345 | 2,347 |
| | CP | | | |
| | 749 | 639 | 10 | 649 |
| | Hills CP | | | |
| | 785 | 2,709 | 1,800 | 4,509 |
| 252 (cont.) | Limestone Hills SO | | | |
| | 634 | 4,081 | 453 | 4,534 |
| | Sandy SD | | | |
| | 627 | 4,365 | 118 | 4,483 |
| | 629 | 3,548 | 919 | 4,467 |
| 253 | Deep Sand SO | | | |
| | 620 | 693 | 5 | 698 |
| | Gravelly SO | | | |
| | 652 | 594 | 0 | 594 |
| | Sandy SD | | | |
| | 632 | 1,824 | 0 | 1,824 |
| 254 | Gravelly CP | | | |
| | 749 | 1,815 | 926 | 2,741 |
| | Gypsum CP | | | |
| | 736 | 2,644 | 464 | 3,108 |
| | Gypsum Hills CP | | | |
| | 787 | 3,814 | 537 | 4,351 |
| | Hills CP | | | |
| | 785 | 266 | 27 | 293 |
| | Limestone Hills SD | | | |
| | 634 | 1,956 | 31 | 1,987 |
| | CP | | | |
| | 732 | 8,842 | 1,348 | 10,190 |
| | Loamy CP | | | |
| | 719 | 934 | 696 | 1,630 |
| | 737 | 617 | 246 | 863 |
| 255 | Deep Sand SO | | | |
| | 620 | 598 | 757 | 1,355 |
| | Hills CP | | | |
| | 785 | 2,350 | 528 | 2,878 |
| | Sandy SD | | | |
| | 632 | 1,731 | 119 | 1,850 |
| 256 | Bottomland SO | | | |
| | 651 | 3,243 | 259 | 3,502 |
| | Gravelly SD | | | |
| | 649 | 692 | 37 | 729 |
| | Hills CP | | | |
| | 785 | 1,259 | 810 | 2,069 |
| | Limestone Hills SD | | | |
| | 634 | 345 | 194 | 539 |
| | Sandy SD | | | |
| | 624 | 1,004 | 356 | 1,360 |
| | 629 | 4,807 | 587 | 5,394 |
| | 632 | 768 | 414 | 1,182 |
| | 645 | 564 | 368 | 932 |
| 258 | Gravelly SD | | | |
| | 649 | 2,988 | 407 | 3,395 |
| | 650 | 2,759 | 106 | 2,865 |
| | Hills CP | | | |
| | 785 | 1,394 | 155 | 1,549 |
| | Igneous Hills SO | | | |
| | 689 | 201 | 215 | 416 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 258 (cont.) | Limestone Hills SD | | | |
| | 634 | 2,831 | 589 | 3,420 |
| | Sandy SD | | | |
| | 632 | 743 | 483 | 1,226 |
| 260 | Bottomland CP | | | |
| | 724 | 262 | 98 | 360 |
| | Gypsum CP | | | |
| | 736 | 2,232 | 1,823 | 4,055 |
| | Gypsum Hills CP | | | |
| | 787 | 3,691 | 1,247 | 4,938 |
| | Hills CP | | | |
| | 786 | 216 | 181 | 397 |
| | Limestone Hills CP | | | |
| | 723 | 155 | 0 | 155 |
| | 732 | 3,060 | 275 | 3,335 |
| | Loamy SD | | | |
| | 641 | 19 | 253 | 272 |
| | CP | | | |
| | 710 | 688 | 1,487 | 2,175 |
| | 735 | 936 | 0 | 936 |
| | 737 | 1,072 | 534 | 1,606 |
| | Sandy SD | | | |
| | 627 | 111 | 0 | 111 |
| 261 | Gravelly SD | | | |
| | 649 | 7,580 | 1,293 | 8,873 |
| | 652 | 3,756 | 839 | 4,595 |
| | 655 | 6,422 | 2,286 | 8,708 |
| | Loamy WP-3 | | | |
| | 445 | 58 | 915 | 973 |
| | No Range Site | | | |
| | 491 | 1,328 | 5,439 | 6,767 |
| 262 | Gypsum CP | | | |
| | 736 | 1,281 | 584 | 1,865 |
| | Hills CP | | | |
| | 785 | 2,200 | 1,648 | 3,848 |
| | Limestone Hills SD | | | |
| | 634 | 4,743 | 5,125 | 9,868 |
| | CP | | | |
| | 731 | 350 | 11 | 361 |
| | 781 | 78 | 239 | 317 |
| | Loamy CP | | | |
| | 719 | 3 | 253 | 256 |
| | 737 | 388 | 158 | 546 |
| 263 | Basalt Hills WP-3 | | | |
| | 406 | 2,417 | 1,508 | 3,925 |
| | Gravelly WP-3 | | | |
| | 449 | 779 | 218 | 997 |
| | 451 | 530 | 1,959 | 2,489 |
| | SD | | | |
| | 649 | 2,292 | 903 | 3,195 |
| | 652 | 531 | 434 | 965 |
| | 655 | 514 | 973 | 1,487 |
| 263 (cont.) | Hills WP-3 | | | |
| | 404 | 2,482 | 343 | 2,825 |
| | 442 | 837 | 626 | 1,463 |
| | Loamy WP-3 | | | |
| | 421 | 302 | 24 | 326 |
| | 445 | 314 | 0 | 314 |
| | 453 | 1,784 | 24 | 1,808 |
| | Malpais WP-3 | | | |
| | 405 | 208 | 23 | 231 |
| | No Range Site | | | |
| | 491 | 650 | 881 | 1,531 |
| 264 | Gravelly CP | | | |
| | 749 | 96 | 170 | 266 |
| | Hills CP | | | |
| | 785 | 2,783 | 562 | 3,345 |
| | Igneous Hills SD | | | |
| | 689 | 145 | 0 | 145 |
| | Limestone Hills SD | | | |
| | 634 | 2,854 | 496 | 3,350 |
| | CP | | | |
| | 731 | 338 | 214 | 552 |
| | Loamy CP | | | |
| | 716 | 444 | 122 | 566 |
| | 719 | 312 | 0 | 312 |
| | 737 | 1,510 | 517 | 2,027 |
| 266 | Gypsum SD | | | |
| | 646 | 1,791 | 636 | 2,427 |
| | CP | | | |
| | 736 | 333 | 0 | 333 |
| | Limestone Hills CP | | | |
| | 732 | 2,516 | 0 | 2,516 |
| | Loamy SD | | | |
| | 636 | 2,801 | 832 | 3,633 |
| | 653 | 544 | 43 | 587 |
| | Sandy SD | | | |
| | 624 | 327 | 0 | 327 |
| | 629 | 518 | 0 | 518 |
| | No Range Site | | | |
| | 687 | 2,264 | 625 | 2,889 |
| 268 | Basalt Hills WP-3 | | | |
| | 406 | 201 | 178 | 379 |
| | Gravelly WP-3 | | | |
| | 449 | 3,525 | 922 | 4,447 |
| | 451 | 368 | 412 | 780 |
| | SD | | | |
| | 649 | 88 | 26 | 114 |
| | 655 | 78 | 101 | 179 |
| | Hills WP-3 | | | |
| | 404 | 5,029 | 3,298 | 8,327 |
| | 442 | 11,642 | 2,785 | 14,427 |
| | CP | | | |
| | 785 | 1,425 | 1,007 | 2,432 |
| | Loamy WP-3 | | | |
| | 421 | 792 | 145 | 937 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 268 (cont.) | Malpais WP-3 | | | |
| | 405 | 205 | 185 | 390 |
| | Shallow WP-3 | | | |
| | 459 | 2,978 | 377 | 3,355 |
| | No Range Site | | | |
| | 491 | 12 | 92 | 104 |
| 271 | Bottomland CP | | | |
| | 724 | 506 | 562 | 1,068 |
| | Gravelly CP | | | |
| | 749 | 159 | 229 | 388 |
| | Gypsum CP | | | |
| | 736 | 0 | 169 | 169 |
| | Hills CP | | | |
| | 786 | 910 | 238 | 1,148 |
| | Limestone Hills CP | | | |
| | 731 | 35 | 75 | 110 |
| | 732 | 265 | 1,165 | 1,430 |
| | Loamy CP | | | |
| | 710 | 210 | 651 | 861 |
| | 716 | 887 | 812 | 1,699 |
| | 719 | 1,424 | 1,069 | 2,493 |
| | 735 | 677 | 674 | 1,351 |
| | 738 | 962 | 435 | 1,397 |
| | Malpais CP | | | |
| | 705 | 2,741 | 1,158 | 3,899 |
| | 784 | 315 | 61 | 376 |
| | Sandy CP | | | |
| | 709 | 898 | 184 | 1,082 |
| | Shallow CP | | | |
| | 783 | 1,403 | 1,279 | 2,682 |
| 272 | Deep Sand SD | | | |
| | 640 | 384 | 214 | 598 |
| | Limestone Hills SD | | | |
| | 634 | 878 | 128 | 1,006 |
| | Loamy SD | | | |
| | 641 | 1,853 | 0 | 1,853 |
| | Sandy SD | | | |
| | 623 | 4,519 | 953 | 5,472 |
| | 624 | 776 | 273 | 1,049 |
| | 635 | 2,998 | 1,592 | 4,590 |
| | 637 | 1,608 | 40 | 1,648 |
| 275A | Bottomland CP | | | |
| | 724 | 14 | 1,020 | 1,034 |
| | 755 | 453 | 1,023 | 1,476 |
| | Gypsum CP | | | |
| | 736 | 444 | 5,730 | 6,174 |
| | Gypsum Hills CP | | | |
| | 787 | 1,026 | 1,163 | 2,189 |
| | Limestone Hills CP | | | |
| | 723 | 206 | 116 | 322 |
| | 732 | 4,633 | 1,869 | 6,502 |
| | 781 | 48 | 113 | 161 |
| 275A (cont.) | Loamy SD | | | |
| | 636 | 621 | 245 | 866 |
| | CP | | | |
| | 735 | 0 | 53 | 53 |
| | 737 | 173 | 3,073 | 3,246 |
| | 748 | 78 | 1,889 | 1,967 |
| | Shallow CP | | | |
| | 783 | 1,792 | 5,890 | 7,682 |
| 275H | Bottomland SD | | | |
| | 651 | 431 | 71 | 502 |
| | CP | | | |
| | 755 | 1,234 | 3,404 | 4,638 |
| | Deep Sand CP | | | |
| | 640 | 4,189 | 574 | 4,763 |
| | 644 | 71 | 234 | 305 |
| | Gravelly SD | | | |
| | 649 | 89 | 399 | 488 |
| | Limestone Hills SD | | | |
| | 634 | 1,333 | 1,106 | 2,439 |
| | Loamy SD | | | |
| | 636 | 244 | 1,196 | 1,440 |
| | 653 | 391 | 71 | 462 |
| | CP | | | |
| | 737 | 0 | 434 | 434 |
| | 748 | 702 | 2,343 | 3,045 |
| | Sandy SD | | | |
| | 627 | 340 | 485 | 825 |
| | 629 | 386 | 2,275 | 2,661 |
| | 635 | 2,055 | 759 | 2,814 |
| | 637 | 1,041 | 322 | 1,363 |
| | 645 | 289 | 331 | 620 |
| 275P | Bottomland SD | | | |
| | 651 | 582 | 245 | 827 |
| | Gravelly SD | | | |
| | 649 | 891 | 488 | 1,379 |
| | Igneous Hills SD | | | |
| | 689 | 865 | 141 | 1,006 |
| | Sandy SD | | | |
| | 629 | 4,797 | 1,078 | 5,875 |
| 276 | Gypsum CP | | | |
| | 736 | 2,083 | 680 | 2,763 |
| | Loamy CP | | | |
| | 735 | 196 | 0 | 196 |
| 277 | Gravelly SD | | | |
| | 622 | 860 | 774 | 1,634 |
| | 649 | 4,761 | 879 | 5,640 |
| | 652 | 5,621 | 2,367 | 7,988 |
| | 655 | 2,839 | 617 | 3,456 |
| | Hills WP-3 | | | |
| | 442 | 404 | 213 | 617 |
| | CP | | | |
| | 785 | 335 | 0 | 335 |
| | Igneous Hills SD | | | |
| | 689 | 196 | 378 | 574 |
| | No Range Site | | | |
| | 491 | 2,046 | 3,041 | 5,087 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 279 | Gravelly SO | | | |
| | 622 | 1,976 | 440 | 2,416 |
| | 649 | 6,524 | 1,250 | 7,774 |
| | 652 | 2,130 | 874 | 3,004 |
| | 655 | 1,519 | 227 | 1,746 |
| | Loamy WP-3 | | | |
| | 419 | 0 | 473 | 473 |
| | 445 | 322 | 160 | 482 |
| | No Range Site | | | |
| | 491 | 877 | 3,881 | 4,758 |
| 280 | Gypsum CP | | | |
| | 736 | 2,279 | 503 | 2,782 |
| | Gypsum Hills CP | | | |
| | 787 | 1,580 | 629 | 2,209 |
| | Hills CP | | | |
| | 785 | 1,602 | 279 | 1,881 |
| | Limestone Hills SO | | | |
| | 634 | 240 | 0 | 240 |
| | CP | | | |
| | 731 | 28 | 1,223 | 1,251 |
| | 732 | 3,420 | 675 | 4,095 |
| | Loamy CP | | | |
| | 710 | 484 | 382 | 866 |
| | 716 | 1,013 | 232 | 1,285 |
| | 719 | 162 | 0 | 162 |
| | 737 | 224 | 0 | 224 |
| | Shallow CP | | | |
| | 783 | 2,232 | 272 | 2,504 |
| 283 | Deep Sand SO | | | |
| | 640 | 187 | 5 | 192 |
| | Gravelly SO | | | |
| | 649 | 2,669 | 654 | 3,323 |
| | CP | | | |
| | 749 | 1,354 | 868 | 2,222 |
| | Gypsum CP | | | |
| | 736 | 39 | 398 | 437 |
| | Hills CP | | | |
| | 785 | 1,822 | 819 | 2,641 |
| | Igneous Hills SD | | | |
| | 689 | 2,166 | 795 | 2,961 |
| | Limestone Hills SD | | | |
| | 634 | 4,383 | 370 | 4,753 |
| | Loamy SO | | | |
| | 653 | 237 | 575 | 812 |
| | CP | | | |
| | 719 | 107 | 838 | 945 |
| | 737 | 399 | 609 | 1,008 |
| | Sandy SD | | | |
| | 624 | 91 | 36 | 127 |
| | 627 | 2,057 | 340 | 2,397 |
| | 629 | 310 | 13 | 323 |
| | 632 | 403 | 0 | 403 |
| | No Range Site | | | |
| | 687 | 0 | 150 | 150 |
| 284 | Bottomland CP | | | |
| | 724 | 204 | 29 | 233 |
| | Loamy CP | | | |
| | 735 | 142 | 32 | 174 |
| | 737 | 326 | 6 | 332 |
| | Sandy CP | | | |
| | 717 | 4,480 | 1,783 | 6,263 |
| | 752 | 2,594 | 981 | 3,575 |
| | 756 | 979 | 73 | 1,052 |
| 285 | Deep Sand SD | | | |
| | 640 | 7,372 | 117 | 7,489 |
| | Gravelly SO | | | |
| | 649 | 1,995 | 508 | 2,503 |
| | 652 | 30 | 198 | 228 |
| | Hills CP | | | |
| | 785 | 323 | 1,706 | 2,029 |
| | Igneous Hills SO | | | |
| | 689 | 306 | 26 | 332 |
| | Sandy SD | | | |
| | 623 | 2,617 | 382 | 2,999 |
| | 624 | 1,122 | 578 | 1,700 |
| | 629 | 558 | 91 | 649 |
| | 632 | 683 | 1,218 | 1,901 |
| | 635 | 3,870 | 720 | 4,590 |
| | 637 | 2,676 | 298 | 2,974 |
| | No Range Site SD | | | |
| | 660 | 120 | 43 | 163 |
| 287 | Deep Sand SO | | | |
| | 640 | 3 | 141 | 144 |
| | Gravelly SD | | | |
| | 649 | 542 | 0 | 542 |
| | Hills CP | | | |
| | 785 | 1,047 | 439 | 1,486 |
| | Limestone Hills SD | | | |
| | 634 | 2,122 | 0 | 2,122 |
| | Sandy SD | | | |
| | 632 | 527 | 220 | 747 |
| 288 | Gravelly SD | | | |
| | 649 | 421 | 0 | 421 |
| | Hills CP | | | |
| | 785 | 3,586 | 600 | 4,186 |
| | Sandy SD | | | |
| | 632 | 307 | 0 | 307 |
| 289 | Bottomland SO | | | |
| | 643 | 615 | 0 | 615 |
| | 651 | 1,759 | 876 | 2,635 |
| | Deep Sand SO | | | |
| | 644 | 321 | 78 | 399 |
| | Loamy SD | | | |
| | 653 | 103 | 0 | 103 |
| | Sandy SD | | | |
| | 629 | 1,693 | 604 | 2,297 |
| | 637 | 840 | 18 | 858 |
| | 645 | 2,620 | 1,018 | 3,638 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 290 | Bottomland CP | | | |
| | 724 | 195 | 190 | 385 |
| | Hills WP-3 | | | |
| | 404 | 1,464 | 342 | 1,806 |
| | 442 | 188 | 499 | 687 |
| | Loamy WP-3 | | | |
| | 431 | 437 | 24 | 461 |
| | 445 | 464 | 1,167 | 1,631 |
| | 467 | 4,837 | 2,920 | 7,757 |
| 291 | Gravelly SO | | | |
| | 649 | 367 | 43 | 410 |
| | Gypsum SO | | | |
| | 646 | 1,222 | 267 | 1,489 |
| | Loamy SO | | | |
| | 636 | 1,824 | 220 | 2,044 |
| | 653 | 1,370 | 2 | 1,372 |
| | Sandy SO | | | |
| | 624 | 2,425 | 172 | 2,597 |
| | 627 | 290 | 0 | 290 |
| | 629 | 292 | 132 | 424 |
| | 645 | 1,665 | 114 | 1,779 |
| | No Range Site | | | |
| | 687 | 162 | 10 | 172 |
| 293 | Bottomland SO | | | |
| | 643 | 199 | 33 | 232 |
| | Deep Sand SO | | | |
| | 640 | 770 | 0 | 770 |
| | Loamy SO | | | |
| | 641 | 428 | 248 | 676 |
| | Malpais SO | | | |
| | 657 | 14,357 | 2,067 | 16,424 |
| | Sandy SD | | | |
| | 623 | 548 | 0 | 548 |
| | 624 | 5,440 | 1,128 | 6,568 |
| | 635 | 10,253 | 1,519 | 11,772 |
| | 637 | 4,489 | 308 | 4,797 |
| | 645 | 118 | 123 | 241 |
| | Shallow Sand SO | | | |
| | 656 | 825 | 50 | 875 |
| 294 | Gravelly WP-3 | | | |
| | 449 | 289 | 787 | 1,076 |
| | SO | | | |
| | 622 | 188 | 23 | 211 |
| | 649 | 983 | 319 | 1,302 |
| | 652 | 27 | 131 | 158 |
| | 655 | 1,103 | 338 | 1,441 |
| | Hills WP-3 | | | |
| | 404 | 130 | 38 | 168 |
| | 442 | 158 | 187 | 345 |
| | 483 | 262 | 3,151 | 3,413 |
| | CP | | | |
| | 785 | 511 | 0 | 511 |
| | Limestone Hills WP-2 | | | |
| | 482 | 199 | 179 | 378 |
| 294 (cont.) | Loamy WP-3 | | | |
| | 445 | 477 | 1,431 | 1,908 |
| | No Range Site | | | |
| | 491 | 130 | 463 | 593 |
| 295 | Gravelly SO | | | |
| | 649 | 3,626 | 2,444 | 6,070 |
| | 652 | 82 | 182 | 264 |
| | 655 | 2,563 | 4,542 | 7,105 |
| | Hills WP-3 | | | |
| | 404 | 42 | 263 | 305 |
| | 442 | 416 | 865 | 1,281 |
| | Loamy WP-3 | | | |
| | 445 | 1,459 | 3,181 | 4,640 |
| | Shallow WP-3 | | | |
| | 459 | 80 | 257 | 337 |
| | No Range Site | | | |
| | 491 | 367 | 795 | 1,162 |
| 297 | Gravelly WP-3 | | | |
| | 441 | 696 | 379 | 1,075 |
| | 449 | 353 | 51 | 404 |
| | SD | | | |
| | 649 | 5,968 | 2,294 | 8,262 |
| | 652 | 3,855 | 568 | 4,423 |
| | 655 | 0 | 159 | 159 |
| | Hills WP-3 | | | |
| | 404 | 1,855 | 754 | 2,609 |
| | 442 | 230 | 458 | 688 |
| | CP | | | |
| | 785 | 765 | 391 | 1,156 |
| | Limestone Hills WP-2 | | | |
| | 482 | 146 | 267 | 413 |
| | No Range Site | | | |
| | 491 | 618 | 189 | 807 |
| 298 | Bottomland CP | | | |
| | 724 | 147 | 198 | 345 |
| | Gypsum CP | | | |
| | 736 | 1,837 | 3,209 | 5,046 |
| | Loamy CP | | | |
| | 735 | 759 | 1,003 | 1,762 |
| | 737 | 92 | 166 | 258 |
| 299 | Gravelly SO | | | |
| | 622 | 566 | 231 | 797 |
| | 649 | 6,129 | 658 | 6,787 |
| | 652 | 1,270 | 102 | 1,372 |
| | 655 | 1,887 | 490 | 2,377 |
| | Hills WP-3 | | | |
| | 442 | 286 | 5 | 291 |
| | No Range Site | | | |
| | 491 | 1,187 | 106 | 1,293 |
| 300 | Gypsum Hills CP | | | |
| | 787 | 372 | 98 | 470 |
| | Hills CP | | | |
| | 785 | 39 | 930 | 969 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 300 (cont.) | Loamy SD | | | |
| | 636 | 180 | 39 | 219 |
| | CP | | | |
| | 719 | 943 | 505 | 1,448 |
| | 737 | 0 | 259 | 259 |
| 301 | Bottomland SD | | | |
| | 651 | 1,117 | 1,635 | 2,752 |
| | CP | | | |
| | 724 | 209 | 1,022 | 1,231 |
| | Gypsum SO | | | |
| | 646 | 2,658 | 1,697 | 4,355 |
| | CP | | | |
| | 736 | 1,665 | 2,674 | 4,339 |
| | Limestone Hills CP | | | |
| | 732 | 1,276 | 559 | 1,835 |
| | Loamy SD | | | |
| | 636 | 48 | 215 | 263 |
| | CP | | | |
| | 735 | 891 | 779 | 1,670 |
| | Sandy SD | | | |
| | 632 | 506 | 1,557 | 2,063 |
| | 635 | 1,277 | 1,154 | 2,431 |
| | 645 | 640 | 523 | 1,163 |
| | CP | | | |
| | 717 | 909 | 299 | 1,208 |
| | 752 | 3,669 | 855 | 4,524 |
| | 756 | 2,413 | 627 | 3,040 |
| 303 | Sandy SD | | | |
| | 629 | 707 | 0 | 707 |
| 306 | Gravelly SD | | | |
| | 649 | 1,031 | 0 | 1,031 |
| | 650 | 3,670 | 1,029 | 4,699 |
| | Hills CP | | | |
| | 785 | 430 | 0 | 430 |
| 308 | Gravelly SO | | | |
| | 622 | 80 | 130 | 210 |
| | 649 | 2,900 | 201 | 3,101 |
| | 652 | 1,094 | 267 | 1,361 |
| | Hills WP-3 | | | |
| | 442 | 124 | 0 | 124 |
| | No Range Site | | | |
| | 491 | 597 | 93 | 690 |
| 312 | Deep Sand SD | | | |
| | 620 | 1,482 | 47 | 1,529 |
| | Gravelly SO | | | |
| | 649 | 376 | 0 | 376 |
| | 652 | 649 | 0 | 649 |
| | Hills CP | | | |
| | 785 | 924 | 0 | 924 |
| | Limestone Hills SO | | | |
| | 634 | 796 | 0 | 796 |
| | Sandy SO | | | |
| | 632 | 5,011 | 0 | 5,011 |
| | No Range Site | | | |
| | 491 | 158 | 0 | 158 |
| 315 | Bottomland WP-2 | | | |
| | 421 | 106 | 0 | 106 |
| | Gravelly SD | | | |
| | 652 | 1,770 | 349 | 2,119 |
| | Hills WP-3 | | | |
| | 404 | 127 | 36 | 163 |
| | CP | | | |
| | 785 | 1,148 | 394 | 1,542 |
| | No Range Site | | | |
| | 491 | 268 | 42 | 310 |
| 317 | Deep Sand SO | | | |
| | 620 | 861 | 155 | 1,016 |
| | Gravelly SD | | | |
| | 649 | 153 | 0 | 153 |
| | 652 | 1,226 | 33 | 1,259 |
| | Sandy SO | | | |
| | 632 | 434 | 0 | 434 |
| | No Range Site | | | |
| | 491 | 537 | 0 | 537 |
| 318 | Gravelly SO | | | |
| | 649 | 248 | 0 | 248 |
| | 650 | 4,039 | 155 | 4,194 |
| | Hills CP | | | |
| | 785 | 146 | 8 | 154 |
| | Limestone Hills SO | | | |
| | 634 | 172 | 0 | 172 |
| | Sandy SD | | | |
| | 632 | 560 | 0 | 560 |
| 321 | Gravelly WP-3 | | | |
| | 449 | 8 | 718 | 726 |
| | SO | | | |
| | 649 | 239 | 673 | 912 |
| | 655 | 162 | 981 | 1,143 |
| | Hills WP-3 | | | |
| | 404 | 1,190 | 0 | 1,190 |
| | 442 | 741 | 393 | 1,134 |
| | Loamy WP-3 | | | |
| | 445 | 36 | 1,047 | 1,083 |
| | 453 | 2,853 | 2,518 | 5,371 |
| 322 | Bottomland SO | | | |
| | 651 | 429 | 143 | 572 |
| | Gravelly SD | | | |
| | 649 | 129 | 59 | 188 |
| | Hills CP | | | |
| | 785 | 4,165 | 2,200 | 6,365 |
| | Limestone Hills SD | | | |
| | 634 | 2,331 | 467 | 2,798 |
| | Loamy SD | | | |
| | 641 | 1,224 | 1,239 | 2,463 |
| | 653 | 1,332 | 66 | 1,398 |
| | Sandy SD | | | |
| | 627 | 1,091 | 62 | 1,153 |
| | No Range Site | | | |
| | 687 | 143 | 0 | 143 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| AMPs | | | | |
| 323 | Basalt Hills WP-3 | | | |
| | 406 | 414 | 21 | 435 |
| | Gravelly WP-3 | | | |
| | 441 | 386 | 94 | 480 |
| | 449 | 417 | 2 | 419 |
| | Hills WP-3 | | | |
| | 404 | 2,237 | 1,695 | 3,932 |
| | 442 | 1,774 | 1,231 | 3,005 |
| | CP | | | |
| | 785 | 277 | 29 | 306 |
| | 786 | 132 | 117 | 249 |
| | Limestone Hills WP-2 | | | |
| | 482 | 136 | 0 | 136 |
| | Loamy WP-3 | | | |
| | 445 | 170 | 25 | 195 |
| | 453 | 1,218 | 2,307 | 3,525 |
| | No Range Site | | | |
| | 491 | 182 | 449 | 631 |
| 325 | Bottomland SD | | | |
| | 651 | 1,229 | 873 | 2,102 |
| | CP | | | |
| | 755 | 98 | 444 | 542 |
| | Deep Sand SO | | | |
| | 640 | 1,075 | 114 | 1,189 |
| | 644 | 911 | 21 | 932 |
| | Gypsum SO | | | |
| | 646 | 898 | 3 | 901 |
| | Loamy SD | | | |
| | 653 | 618 | 1,532 | 2,150 |
| | Sandy SO | | | |
| | 624 | 1,237 | 267 | 1,504 |
| | 629 | 104 | 514 | 618 |
| | 635 | 400 | 10 | 410 |
| | 637 | 1,140 | 478 | 1,618 |
| | 645 | 1,325 | 365 | 1,690 |
| 327 | Bottomland CP | | | |
| | 724 | 252 | 0 | 252 |
| | Gypsum CP | | | |
| | 736 | 2,731 | 3,324 | 6,055 |
| | Limestone Hills SO | | | |
| | 634 | 246 | 6 | 252 |
| | CP | | | |
| | 731 | 178 | 405 | 583 |
| | 732 | 619 | 941 | 1,560 |
| | Loamy CP | | | |
| | 710 | 29 | 408 | 437 |
| | 735 | 24 | 242 | 266 |
| | 748 | 427 | 365 | 792 |
| | Sandy SD | | | |
| | 632 | 240 | 186 | 426 |
| | CP | | | |
| | 752 | 700 | 283 | 983 |
| | 756 | 207 | 0 | 207 |
| 328 | Bottomland SO | | | |
| | 651 | 2,393 | 996 | 3,389 |
| 328 (cont.) | Loamy SO | | | |
| | 653 | 152 | 73 | 225 |
| | Sandy SO | | | |
| | 624 | 307 | 26 | 333 |
| | 627 | 599 | 365 | 964 |
| | 629 | 1,039 | 460 | 1,499 |
| 330 | Bottomland CP | | | |
| | 724 | 0 | 184 | 184 |
| | 755 | 0 | 139 | 139 |
| | Gypsum CP | | | |
| | 736 | 67 | 1,422 | 1,489 |
| | Limestone Hills SD | | | |
| | 634 | 141 | 271 | 412 |
| | Loamy CP | | | |
| | 735 | 495 | 394 | 889 |
| | 737 | 3 | 222 | 225 |
| | 748 | 222 | 589 | 811 |
| | Sandy SO | | | |
| | 629 | 68 | 392 | 460 |
| | 632 | 2,096 | 1,324 | 3,420 |
| 347 | Limestone Hills CP | | | |
| | 731 | 147 | 0 | 147 |
| | 732 | 299 | 114 | 413 |
| 348 | Limestone Hills CP | | | |
| | 732 | 587 | 99 | 686 |
| | Loamy CP | | | |
| | 716 | 223 | 0 | 223 |
| | Shallow CP | | | |
| | 783 | 1,376 | 61 | 1,437 |
| 349 | Limestone Hills CP | | | |
| | 731 | 461 | 0 | 461 |
| | 732 | 316 | 0 | 316 |
| | Loamy CP | | | |
| | 716 | 213 | 0 | 213 |
| | Shallow CP | | | |
| | 783 | 228 | 0 | 228 |
| 360 | Bottomland CP | | | |
| | 724 | 0 | 109 | 109 |
| | Limestone Hills CP | | | |
| | 732 | 302 | 57 | 359 |
| | Loamy CP | | | |
| | 719 | 18 | 164 | 182 |
| | 735 | 223 | 95 | 318 |
| | Sandy CP | | | |
| | 709 | 98 | 254 | 352 |
| | 717 | 293 | 88 | 381 |
| | 756 | 664 | 0 | 664 |
| | Shallow CP | | | |
| | 783 | 107 | 63 | 170 |
| NON-AMPs | | | | |
| 017 | Hills CP | | | |
| | 785 | 887 | 0 | 887 |
| | Limestone Hills WP-2 | | | |
| | 482 | 144 | 0 | 144 |
| | WP-3 | | | |
| | 432 | 407 | 0 | 407 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| NON-AMPs | | | | |
| 017 (cont.) | Loamy WP-3 | | | |
| | 418 | 146 | 0 | 146 |
| | 419 | 403 | 0 | 403 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 1,135 | 0 | 1,135 |
| 113 | Deep Sand SD | | | |
| | 620 | 187 | 0 | 187 |
| 134 | Limestone Hills WP-2 | | | |
| | 432 | 732 | 0 | 732 |
| | 482 | 660 | 0 | 660 |
| 143 | Sandy SO | | | |
| | 632 | 310 | 0 | 310 |
| 145 | Basalt Hills WP-3 | | | |
| | 406 | 481 | 0 | 481 |
| | Gravelly WP-3 | | | |
| | 441 | 1,581 | 0 | 1,581 |
| | Loamy WP-3 | | | |
| | 445 | 320 | 0 | 320 |
| | Shallow Sandstone WP-2 | | | |
| | 434 | 1,560 | 0 | 1,560 |
| 165 | All soils have less than 100 acres. | | | |
| 267 | Hills WP-3 | | | |
| | 404 | 1,490 | 0 | 1,490 |
| | 442 | 793 | 0 | 793 |
| | Loamy WP-3 | | | |
| | 453 | 160 | 0 | 160 |
| 281 | Hills WP-3 | | | |
| | 404 | 1,929 | 0 | 1,929 |
| | 442 | 1,275 | 0 | 1,275 |
| | Loamy WP-3 | | | |
| | 445 | 707 | 0 | 707 |
| | 453 | 833 | 0 | 833 |
| | 467 | 828 | 0 | 828 |
| 282 | Loamy CP | | | |
| | 735 | 419 | 0 | 419 |
| | 748 | 243 | 0 | 243 |
| | Sandy CP | | | |
| | 756 | 164 | 0 | 164 |
| 296 | Loamy WP-3 | | | |
| | 410 | 2,656 | 0 | 2,656 |
| | 445 | 1,062 | 0 | 1,062 |
| | 453 | 1,594 | 0 | 1,594 |
| 310 | Sandy CP | | | |
| | 717 | 679 | 0 | 679 |
| | 752 | 436 | 0 | 436 |
| | 756 | 127 | 0 | 127 |
| 340 | Hills CP | | | |
| | 786 | 146 | 0 | 146 |
| | Limestone Hills CP | | | |
| | 731 | 352 | 0 | 352 |
| | Loamy CP | | | |
| | 710 | 294 | 0 | 294 |
| | 735 | 137 | 0 | 137 |
| 340 (cont.) | Sandy CP | | | |
| | 709 | 599 | 0 | 599 |
| | 756 | 108 | 0 | 108 |
| | Shallow CP | | | |
| | 783 | 404 | 0 | 404 |
| 341 | Loamy CP | | | |
| | 716 | 106 | 0 | 106 |
| 342 | Limestone Hills CP | | | |
| | 732 | 341 | 0 | 341 |
| | Loamy CP | | | |
| | 716 | 123 | 0 | 123 |
| | 738 | 227 | 0 | 227 |
| | Shallow CP | | | |
| | 783 | 831 | 0 | 831 |
| 343 | Shallow CP | | | |
| | 783 | 1,543 | 0 | 1,543 |
| 345 | Gravelly SO | | | |
| | 655 | 132 | 0 | 132 |
| | Loamy WP-3 | | | |
| | 445 | 678 | 0 | 678 |
| | Shallow WP-3 | | | |
| | 459 | 102 | 0 | 102 |
| | No Range Site | | | |
| | 491 | 135 | 0 | 135 |
| 350 | Limestone Hills CP | | | |
| | 731 | 314 | 0 | 314 |
| | Loamy CP | | | |
| | 719 | 395 | 0 | 395 |
| | 735 | 401 | 0 | 401 |
| | Shallow CP | | | |
| | 783 | 202 | 0 | 202 |
| 351 | Gravelly WP-3 | | | |
| | 449 | 520 | 0 | 520 |
| | SD | | | |
| | 655 | 209 | 0 | 209 |
| | Loamy WP-3 | | | |
| | 445 | 718 | 0 | 718 |
| | No Range Site | | | |
| | 491 | 133 | 0 | 133 |
| 352 | Hills CP | | | |
| | 786 | 300 | 0 | 300 |
| | Limestone Hills CP | | | |
| | 731 | 636 | 0 | 636 |
| | 732 | 272 | 0 | 272 |
| | Loamy CP | | | |
| | 716 | 168 | 0 | 168 |
| | 719 | 1,191 | 0 | 1,191 |
| | 738 | 289 | 0 | 289 |
| | Shallow CP | | | |
| | 783 | 851 | 0 | 851 |

TABLE A-19 (continued)

SOILS AND RANGE SITES BY ALLOTMENT



| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| NON-AMPs | | | | |
| 353 | Loamy CP | | | |
| | 716 | 528 | 0 | 528 |
| | 719 | 176 | 0 | 176 |
| | Shallow CP | | | |
| | 783 | 630 | 0 | 630 |
| 354 | All soils are less than 100 acres | | | |
| 355 | Loamy WP-3 | | | |
| | 453 | 1,696 | 0 | 1,696 |
| 356 | Hills WP-3 | | | |
| | 404 | 459 | 0 | 459 |
| | Shallow WP-3 | | | |
| | 490 | 122 | 0 | 122 |
| 358 | Loamy CP | | | |
| | 716 | 245 | 0 | 245 |
| | Shallow CP | | | |
| | 783 | 2,058 | 0 | 2,058 |
| 361 | Gypsum CP | | | |
| | 736 | 402 | 0 | 402 |
| 362 | All soils are less than 100 acres | | | |

| ALLOT. | RANGE SITE, MLRA, SOIL MAPPING UNIT | ACRES* PUBLIC | OTHER | TOTAL |
|---|---|---|---|---|
| ELIMINATION OF GRAZING | | | | |
| 286 | Gravelly SD | | | |
| | 652 | 345 | 0 | 345 |
| 302 | Gravelly SD | | | |
| | 649 | 105 | 0 | 105 |
| | Hills CP | | | |
| | 785 | 266 | 0 | 266 |
| 311 | All soils are less than 100 acres | | | |
| 357 | Hills CP | | | |
| | 785 | 803 | 0 | 803 |
| | Loamy WP-3 | | | |
| | 421 | 108 | 0 | 108 |
| | No Range Site | | | |
| | 491 | 168 | 0 | 168 |

* Soils that have less than 100 acres on an allotment are not listed. All acres are rounded off to the nearest whole acre.

Source: Socorro County Soil Survey, Socorro District

## METHODOLOGY FOR DETERMINING WIND ERODIBILITY GROUPS (WEG)

Soils were placed in wind erodibility groups according to the texture of the surface inch of soil, unless very wet or stony, according to the following SCS technical guide (1976).

### Guide for Estimating Wind Erodibility Group from Soil Textures

| Texture of surface inch | WEG |
|---|---|
| Very fine sand, fine sand, and medium sand | 1 |
| Loamy sand, loamy fine sand | 2 |
| Very fine sandy loam, fine sandy loam, sandy loam | 3 |
| Clay, silty clay, noncalcareous clay loam and silty clay loam with more than 35 percent clay content | 4 |
| Calcareous loam and silt loam; calcareous clay loam and silty clay loam with less than 35 percent clay content | 4L |
| Noncalcareous loam and silt loam with less than 20 percent clay content; sandy clay loam, sandy clay | 5 |
| Noncalcareous loam and silt loam with more than 20 percent clay content; noncalcareous clay loam with less than 35 percent clay content | 6 |
| Silt; noncalcareous silty clay loam with less than 35 percent clay content | 7 |
| Very wet or stony; not subject to wind erosion | 8 |

The adjectives to be used in describing the soil blowing hazard based on wind erodibility group are:

| | |
|---|---|
| WEG-1 | Very High Soil Blowing Hazard |
| WEG-2 | Very High Soil Blowing Hazard |
| WEG-3 | High Soil Blowing Hazard |
| WEG-4 | High Soil Blowing Hazard |
| WEG-4L | High Soil Blowing Hazard |
| WEG-5 | Moderate Soil Blowing Hazard |
| WEG-6 | Moderate Soil Blowing Hazard |
| WEG-7 | Moderate Soil Blowing Hazard |
| WEG-8 | Slight Soil Blowing Hazard |

## PSIAC METHOD FOR CALCULATING SEDIMENT YIELD

The Pacific Southwestern Inter-Agency Committee's (1968) Method for determining soil loss was used in the water erosion portion of the Soils Section.

The following is the sediment yield classification:

| Sediment Yield Classification | Rating | Sediment Yield Ac. ft./sq. mi./ yr. |
|---|---|---|
| 1 Severe | More than 100 | More than 3.0 |
| 2 Critical | 70-100 | 1.0-3.0 |
| 3 Moderate | 50-70 | 0.5-1.0 |
| 4 Slight | 27-50 | 0.2-0.5 |
| 5 Stable | Less than 27 | Less than 0.2 |

Nine factors were evaluated for present and future sediment yield, and points were assigned to each factor by using the PSIAC nomographs. The points were totaled for each soil and placed in sediment yield classes. The following are the factors for evaluation use to determine these ratings.

| Factors | PSIAC Factor Rating Minimum | Maximum |
|---|---|---|
| A. - Surface Geology - | 0 | 10 |
| Surface geology was evaluated as soil texture from a depth of 0 to 4 inches to determine this rating. Sandy soils received the lowest rating, 0, and soils with a high clay content received a high rating, 10. | | |
| B. - Soils - | 0 | 10 |
| This factor was rated the same as surface geology except the depth is 4 inches to effective rooting depth. | | |
| C. - Climate - | 0 | 10 |
| Climate was rated according to the value on the PSIAC nomograph for a 2-year, 6-hour, isopluvial storm in the NOAA Atlas 2. | | |
| D. - Precipitation Intensity - (Runoff) | 0 | 10 |
| Precipitation intensity was rated the same as climate for the Existing Environment, but was rated 1 or 2 points lower for the Proposed Action according to the runoff reductions in the Water Resources Section. | | |
| E. - Topography - | 0 | 20 |
| This factor was rated according to the percent slope. A soil with a 30-percent slope got the maximum number of points, 20, and a nearly level soil got the minimum factor rating, 0. | | |
| F. - Cover - | -10 | 10 |
| The amount of cover includes the percent cover from vegetation plus the percent coarse fragments on the soil surface. A soil with 100-percent cover would receive a rating of -10. A soil with 0-percent cover would receive a rating of 10. Percent cover and the associated PSIAC rating for the Existing Environment, Proposed Action, and alternatives is presented in Table A-21, p. A-77. | | |
| G. - Land Use - | -10 | 10 |
| Land use was determined by the percent utilization from the Vegetation Section. A soil with 100-percent utilization would receive a rating of 10. A soil with 0-percent utilization would receive a rating of -10. | | |
| H. - Upland Erosion - | 0 | 25 |
| SSFs were used for rating the amount of upland erosion. The SSF for the most representative soil was used for every mapping unit. SSF methodology is presented in Appendix 1, Figure A-2, p. A-11. | | |
| I. - Channel Erosion and Sediment Transport - | 0 | 25 |
| The rating for this factor was determined by field observation for the amount of gullying. A soil with active headcuts and continuously eroding banks would receive the maximum rating of 25. | | |

PSIAC factor points were totaled and assigned a sediment yield value from Table A-21, p. A-77. An example of factors affecting a high, medium, and low sediment yield and their associated PSIAC factor rating is presented in Figure A-8, p. A-76.

Methodology for Calculating Sediment Yield

The only variables for this method are precipitation intensity (runoff), cover, land use, and SSFs (upland erosion). Each soil was rated by the PSIAC method for Existing Environment and Proposed Action. The range site sediment yield values are the weighted average of all the soils in that range site.

Existing Environment

D - Precipitation intensity was determined from the NOAA Atlas 2 and was rated 7 for WP-2 and WP-3, 6 for SD, and 8 for CP.

F - Cover was rated by the percent coarse fragments on the soil surface plus the vegetative cover. The vegetative cover is the weighted average of the percent cover for all the vegetative types in a particular range site and is calculated from Table 2-2 in the Vegetation Section.

G - Land use is the average percent utilization over the entire ES Area. For the present it is 70 percent and is rated 5 for factor G.

H - The SSF for the most representative soil in each mapping unit was used (SSFs were determined by the range survey).

Proposed Action -

D - Runoff (precipitation intensity) reductions from the Water Resources Section amounted to a 2 point reduction for factor D.

F - Cover changed according to range site (Table A-20, p. A-75).

G - Land use for the Proposed Action was reduced to 50 percent which was rated 1 for factor G.

H - The future SSF value was used. In some cases there would be no change in the SSF points and in other cases there would be as much as a 5-point reduction.

There was a minimum of a 6-point reduction for the Proposed Action plus any change in cover and SSF.

No Action/Future Environment

The 25 existing AMP allotments would have the same sediment yield values as the Proposed Action and the 96 non-AMP allotments would have the same sediment yield values as the Existing Environment.

Livestock Adjustment

D - Precipitation intensity (runoff) was reduced 1 point.

F - Cover changes are displayed in Table A-20, p. A-75 by range site.

G - Land use was changed to 50 percent and was rated 1.

H - The SSF value used was .5(EE-PA)+PA.

This alternative resulted in a minimum 5-point reduction from the Existing Environment plus any change in SSF and cover by range site.

Pasture Capacity Level/Enhancement of Sensitive Resource Values

D - Precipitation intensity (runoff) was reduced by 2 points.

F - Cover changes are displayed in Table A-20, p. A-75 by range site.

G - Land use changed to 39 percent and was rated 0.

H - The same SSF as the Proposed Action was used. There was a minimum of a 7-point reduction plus any change in cover or SSF.

No Grazing - On Public Land Only

D - Precipitation intensity (runoff) was reduced by 1 point.

F - Cover changes are displayed in Table A-20, p. A-75.

G - Land use was 0 and was rated -10.

H - The same SSF as the Proposed Action was used.

The No Grazing Alternative resulted in a 10-point reduction from the Proposed Action plus the change in cover by range site.

TABLE A-20

PERCENT COVER AND PSIAC FACTOR RATING FOR COVER*
FOR SOIL EROSION CALCULATIONS BY RANGE SITE

| | | EE-NA/FE*** | | PA-NA/FE**** | | LA | | PCL/ESR | | NG ** | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Range Site | MLRAs | % Cover | PSIAC* Cover Factor Rating | % Cover | PSIAC* Cover Factor Rating | % Cover | PSIAC* Cover Factor Rating | % Cover | PSIAC* Cover Factor Rating | % Cover | PSIAC* Cover Factor Rating |
| Basalt Hills | | | | | | | | | | | |
| | WP-2 | 34 | +3 | 35 | +3 | 34 | +3 | 38 | +2 | 38 | +2 |
| | WP-3 | 24 | +5 | 24 | +5 | 24 | +5 | 26 | +5 | 26 | +5 |
| Bottomland | | | | | | | | | | | |
| | WP-2 | 15 | +7 | 25 | +5 | 22 | +6 | 27 | +5 | 18 | +6 |
| | WP-3 | 6 | +9 | 6 | +9 | 6 | +9 | 7 | +9 | 7 | +9 |
| | SD | 19 | +6 | 23 | +5 | 22 | +6 | 25 | +5 | 22 | +6 |
| | CP | 24 | +5 | 34 | +3 | 31 | +4 | 37 | +3 | 28 | +4 |
| Deep Sand | | | | | | | | | | | |
| | SD | 18 | +6 | 18 | +6 | 18 | +6 | 20 | +6 | 20 | +6 |
| Gravelly | | | | | | | | | | | |
| | WP-3 | 47 | +1 | 50 | 0 | 50 | 0 | 55 | -1 | 55 | -1 |
| | SD | 53 | -1 | 54 | -1 | 54 | -1 | 59 | -2 | 60 | -2 |
| | CP | 54 | -1 | 54 | -1 | 54 | -1 | 59 | -2 | 60 | -2 |
| Gypsum | | | | | | | | | | | |
| | SD | 16 | +7 | 16 | +7 | 16 | +7 | 17 | +7 | 18 | +6 |
| | CP | 24 | +5 | 28 | +4 | 27 | +5 | 31 | +4 | 27 | +5 |
| Gypsum Hills | | | | | | | | | | | |
| | CP | 29 | +4 | 29 | +4 | 29 | +4 | 32 | +4 | 33 | +3 |
| Hills | | | | | | | | | | | |
| | WP-3 | 46 | +1 | 48 | 0 | 48 | 0 | 52 | 0 | 52 | 0 |
| | CP | 51 | 0 | 54 | -1 | 53 | -1 | 59 | -2 | 57 | -1 |
| Igneous Hills | | | | | | | | | | | |
| | SD | 45 | +1 | 45 | +1 | 45 | +1 | 49 | 0 | 50 | 0 |
| Limestone Hills | | | | | | | | | | | |
| | WP-2 | 44 | +1 | 45 | +1 | 45 | +1 | 49 | 0 | 49 | 0 |
| | WP-3 | 64 | -3 | 68 | -4 | 67 | -3 | 74 | -5 | 72 | -4 |
| | SD | 61 | -2 | 63 | -3 | 62 | -2 | 68 | -4 | 68 | -4 |
| | CP | 46 | +1 | 50 | 0 | 49 | 0 | 55 | -1 | 52 | 0 |
| Loamy | | | | | | | | | | | |
| | WP-2 | 20 | +6 | 27 | +5 | 25 | +5 | 30 | +4 | 23 | +5 |
| | WP-3 | 34 | +3 | 38 | +2 | 37 | +3 | 42 | +2 | 39 | +2 |
| | SD | 27 | +5 | 29 | +4 | 28 | +4 | 32 | +4 | 30 | +4 |
| | CP | 26 | +5 | 33 | +3 | 31 | +4 | 35 | +3 | 29 | +4 |
| Malpais | | | | | | | | | | | |
| | WP-2 | 36 | +3 | 44 | +1 | 41 | +2 | 48 | 0 | 41 | +2 |
| | WP-3 | 29 | +4 | 31 | +4 | 31 | +4 | 34 | +3 | 35 | +3 |
| | SD | 57 | -1 | 57 | -1 | 57 | -1 | 62 | -2 | 64 | -3 |
| | CP | 31 | +4 | 31 | +4 | 31 | +4 | 34 | +3 | 35 | +3 |
| Sandstone Hills | | | | | | | | | | | |
| | WP-2 | 47 | +1 | 47 | +1 | 47 | +1 | 51 | 0 | 53 | -1 |
| Sandy | | | | | | | | | | | |
| | WP-2 | 16 | +7 | 16 | +7 | 16 | +7 | 17 | +7 | 18 | +6 |
| | WP-3 | 10 | +8 | 11 | +8 | 11 | +8 | 12 | +8 | 12 | +8 |
| | SD | 24 | +5 | 28 | +4 | 27 | +5 | 31 | +4 | 27 | +5 |
| | CP | 25 | +5 | 33 | +3 | 31 | +4 | 35 | +3 | 34 | +3 |
| Shallow | | | | | | | | | | | |
| | WP-2 | 46 | +1 | 46 | +1 | 46 | +1 | 50 | 0 | 52 | 0 |
| | WP-3 | 40 | +2 | 45 | +1 | 44 | +1 | 49 | 0 | 45 | +1 |
| | CP | 48 | 0 | 53 | -1 | 52 | 0 | 58 | -2 | 54 | -1 |
| Shallow Sandstone | | | | | | | | | | | |
| | WP-2 | 35 | +3 | 35 | +3 | 35 | +3 | 38 | +2 | 39 | +2 |
| Shallow Sandy | | | | | | | | | | | |
| | SD | 26 | +5 | 26 | +5 | 26 | +5 | 28 | +4 | 29 | +4 |
| Average % Cover | | 34.1 | | 36.8 | | 36.1 | | 40.1 | | 38.7 | |

* PSIAC Factor Rating for Cover is explained in Appendix 3, p. A-73.
** EE - Existing Environment
NA/FE - No Action Alternative and Future Environment
PA - Proposed Action
LA - Livestock Adjustment Alternative
PCL/ESR - Pasture Capacity Level and Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative (on public land)

*** NA/FE on non-AMP allotments
****NA/FE on AMP allotments

Source: Range Survey and Socorro County Soil Survey, Socorro District

FIGURE A-8

AN EXAMPLE OF FACTORS AFFECTING A HIGH, MODERATE, AND LOW SEDIMENT YIELD IN THE PACIFIC SOUTHWEST

| Sediment Yield Levels | A<br>Surface Geology (Surface Texture ¼"-4") | B<br>Soils (Texture from 4" to ERD) | C<br>Climate | D<br>Precipitation Intensity (Runoff) | E<br>Topography (Slope) | F<br>Cover (Vegetation and Coarse Fragments) | G<br>Land Use (Average % Utilization) | H<br>Upland Erosion (SSFs) | I<br>Channel Erosion and Sediment Transport |
|---|---|---|---|---|---|---|---|---|---|
| PSIAC Factor Rating | (10) | (10) | (10) | (10) | (20) | (10) | (10) | (25) | (25) |
| Maxium PSIAC Rating=130<br><br>High | Fine textured soils: easily dispersed<br><br>Sandy clay, silty clay, clay | Fine texture soils: easily dispersed<br><br>Sandy clay, silty clay, clay | 2.0 value for a 2-year, 6-hour isopluvial | 2.0 value for a 2-year, 6-hour isopluvial | Slopes greater than 30% | 0% ground cover | 100% Utilization | SSF=100 | Eroding banks continuously or at frequent intervals with large depths and long flow duration<br><br>Active headcuts and degradation in tributary channels |
| PSIAC Factor Rating | (5) | (5) | (5) | (5) | (10) | (0) | (0) | (10) | (10) |
| Moderate | Medium textured soils<br><br>Loam, silt loam, silt | Medium textured soils<br><br>Loam, silt loam, silt | .9 value for 2-year, 6-hour isopluvial | .9 value for 2-year, 6-hour isopluvial | 15% Slopes | 50% ground cover | 40% Utilization | SSF=34 | Moderate flow depths, medium flow duration with occasionally eroding banks or bed |
| PSIAC Factor Rating | (0) | (0) | (0) | (0) | (0) | (-10) | (-10) | (0) | (0) |
| Minimum PSIAC Rating=-20<br><br>Low | Coarse textured soils<br><br>Sand, loamy sand | Coarse textured soils<br><br>Sand, loamy sand | 0 value for a 2-year, 6-hour isopluvial | 0 value for a 2-year, 6-hour, isopluvial | Slopes less than 3% | 100% ground cover | 0% Utilization | SSF=0 | Wide shallow channels with flat gradients, short flow duration<br><br>Channels in massive rock, large boulders, or well vegetated<br><br>Artificially controlled channels |

*ERD=Effective root depth

Source: PSIAC, 1968

AN EXAMPLE OF PSIAC SEOIMENT YIELO CALCULATION FOR 8LUEPOINT SANO
(Mapping Unit 620)

FOR EXISTING ENVIRONMENT:

| Factors | PSIAC Factor Rating |
|---|---|
| A. The surface texture is sand which receives a 0 rating. | 0 |
| 8. The texture from 4 inches to the effective rooting depth is a find sand which receives a 0 rating. | 0 |
| C. Climate is rated 6 because this soil is in the SO MLRA. | 6 |
| O. Precipitation intensity is rated the same as climate, 6. | 6 |
| E. Topography is rated 2 because the slope range is 1 to 5 percent. | 2 |
| F. Percent cover on a deep sand range site is 18 percent, for a rating of 6 (Appendix 3, Table A-20, p. A-75). | 6 |
| G. Land use, percent utilization, is presently 70 percent; so this factor receives a rating of 5. | 5 |
| H. The present SSF is 50 which receives a factor rating of 14. | 14 |
| I. The sandy 8luepoint soil has very little gullying; so it receives a rating of 2 for channel erosion and sediment transport. | 2 |
| TOTAL RATING = | 41 |

Refer to Table A-21, p. A-77 to convert the PSIAC factor rating to a sediment yield value. A PSIAC rating of 41 has a sediment yield of .35 acre-feet per square mile per year and is in the slight sediment yield class, .20 to .50 acre-feet per square mile per year.

TA8LE A-21

PSIAC CONVERSION FACTORS

| Total PSIAC Factor Rating | Sediment Yield Ac.-ft./mi.sq./yr. | Total PSIAC Factor Rating | Sediment Yield Ac.-ft./mi.sq./yr. | Total PSIAC Factor Rating | Sediment Yield Ac.-ft./mi.sq./yr. | Total PSIAC Factor Rating | Sediment Yield Ac.-ft./mi.sq./yr. |
|---|---|---|---|---|---|---|---|
| 1 | .0 | 26 | .190 | 51 | .52 | 76 | 1.25 |
| 2 | .0 | 27 | .20 | 52 | .53 | 77 | 1.30 |
| 3 | .0 | 28 | .20 | 53 | .55 | 78 | 1.35 |
| 4 | .0 | 29 | .21 | 54 | .56 | 79 | 1.40 |
| 5 | .0 | 30 | .22 | 55 | .58 | 80 | 1.45 |
| 6 | .1 | 31 | .24 | 56 | .60 | 81 | 1.50 |
| 7 | .1 | 32 | .25 | 57 | .63 | 82 | 1.55 |
| 8 | .11 | 33 | .26 | 58 | .65 | 83 | 1.60 |
| 9 | .11 | 34 | .27 | 59 | .68 | 84 | 1.65 |
| 10 | .12 | 35 | .28 | 60 | .70 | 85 | 1.78 |
| 11 | .12 | 36 | .29 | 61 | .73 | 86 | 1.80 |
| 12 | .13 | 37 | .30 | 62 | .75 | 87 | 1.90 |
| 13 | .130 | 38 | .31 | 63 | .79 | 88 | 2.0 |
| 14 | .14 | 39 | .33 | 64 | .82 | 89 | 2.05 |
| 15 | .138 | 40 | .34 | 65 | .85 | 90 | 2.1 |
| 16 | .140 | 41 | .35 | 66 | .87 | 91 | 2.15 |
| 17 | .143 | 42 | .36 | 67 | .91 | 92 | 2.20 |
| 18 | .145 | 43 | .37 | 68 | .95 | 93 | 2.30 |
| 19 | .148 | 44 | .38 | 69 | .98 | 94 | 2.40 |
| 20 | .150 | 45 | .40 | 70 | 1.00 | 95 | 2.50 |
| 21 | .160 | 46 | .42 | 71 | 1.08 | 96 | 2.60 |
| 22 | .170 | 47 | .44 | 72 | 1.15 | 97 | 2.70 |
| 23 | .18 | 48 | .45 | 73 | 1.18 | 98 | 2.80 |
| 24 | .19 | 49 | .48 | 74 | 1.20 | 99 | 2.90 |
| 25 | .19 | 50 | .50 | 75 | 1.23 | 100 | 3.00 |

Source: 8LM PSIAC Nomographs

Additional Methodologies

More extensive methodologies regarding sediment yield calculations are filed in the BLM Socorro Oistrict Office.

# APPENDIX 4

WATER RESOURCES


| | Page |
|---|---|
| Methodology Used in Calculations for Watershed Data | A-78 |
| Table A-22 SCS, Modified SCS, FHWA, and Log-Pearson Type III Flows on Canada Montosa | A-78 |
| General Remarks | A-79 |
| Figure A-9 Method for Estimating a Site Specific Curve Number for a Small Watershed (Example: Jornada Closed Basin) | A-80 |
| Figure A-10 SCS Method for Calculating Peak Discharge from Small Ungaged Watersheds | A-81 |
| Table A-23 Soil Vegetative Cover Complexes | A-82 |

## METHODOLOGY USED IN CALCULATIONS FOR WATERSHED DATA

The lack of historical streamflow data for the ephemeral streams in the ES Area makes it difficult to predict the changes in surface runoff that may be expected as a result of grazing management. Several methods of estimating peak flows from ungaged watersheds have been developed based on empirical relations between various watershed parameters and peak flow rates. In order to use these methods, individual watersheds were selected from the ES Area and tested with various methodologies to determine which approaches would be most useful for describing the response of peak flows to changes in vegetative cover. The process of estimating changes in surface runoff due to improved grazing management in the ES Area was accomplished in three steps. A detailed discussion of the procedures used in each step of the analysis follows.

### Selection of Representative Watersheds

Two respresentative watersheds were selected from each of the major drainages described in the Existing Environment portion of Water Resources for use in the peak flow calculations. Watersheds were selected from the Rio Puerco and Rio Salado drainages, the Jornada closed basin, and tributary areas draining directly into the Rio Grande on the basis of the following criteria: watershed area, percent of public land subject to the Proposed Action, vegetative and hydrologic soil types.

Watershed areas of approximately 10 and 25 square miles were arbitrarily selected for the peak flow calculations, although some watersheds were larger. The percent of public land in the watershed had to constitute at least 30 percent of the total watershed area to ensure that the representative areas selected were subject to the Proposed Action. Vegetation in the selected watershed was considered representative of the major drainage (e.g., the Jornada Closed Basin) only if that same vegetative type constituted at least 15 percent of the entire drainage area vegetation. Hydrologic soil types were judged to be representative in a similar manner.

The location, size, and various other physical parameters of the watersheds selected for runoff computations are presented in Table 2-12. In the Rio Puerco and Rio Salado drainages, public land was the limiting factor in selecting appropriate watersheds, as much of the land in these drainages is privately or State owned.

### Peak Flow Methodologies

Three methodologies initially were applied to the representative watersheds for estimating peak flow response to variations in vegetative cover: the Soil Conservation Service (SCS, 1972) Method, the SCS Method Adapted for Infiltration (Gifford et al 1975) and the Federal Highway Administration (FHWA) Method (Fletcher et al 1976). To determine which method to use in the ES calculations, each method was compared to real data collected from streamflow records for Canada Montosa, an arroyo draining an area of 28.2 square miles in the northeast corner of the ES Area. United States Geological Survey (USGS) crest stage records date back to 1961 for this arroyo. It was possible to calculate flood flows for various return periods up to 25 years using the Log-Pearson Type III Method (U. S. Water Resources Council, 1976). The results of these calculations are presented in Table A-22.

TABLE A-22

SCS, MODIFIED SCS, FHWA, AND LOG-PEARSON TYPE III FLOWS ON CANADA MONTOSA

| Flood Year | SCS | Modified SCS | FHWA | Log Pearson Type III |
|---|---|---|---|---|
| 2 | 3,247 | 3,897 | 56 | 313 |
| 5 | 6,278 | 6,928 | 83 | 1,039 |
| 10 | 9,958 | 10,824 | 117 | 2,379 |
| 25 | 14,072 | 15,154 | 160 | 6,823 |

Source: BLM Socorro District Files

Table A-22, p. A-78, also presents estimates of the 2-, 5-, 10-, and 25-year floods for Canada Montosa as calculated by the three methods previously mentioned. Each of these methods was compared to the Log-Pearson flood estimates by a linear regression analysis relating predicted flows to real (Log-Pearson) flood flows. The resulting equations are presented below:

For the SCS Method: $\log Y = -4.71+2.04 \log X \quad r^2 = .99$

Modified SCS Method: $\log Y = -5.45+2.21 \log X \quad r^2 = .99$

FHWA Method: $\log Y = -2.62+2.91 \log X \quad r^2 = .99$

Where Y = real (Log-Pearson) peak flows

X = predicted peak flows

As can be seen from the $r^2$ values ($r^2$ range from 0 to 1, with 1 indicating the "best fit" and 0 indicating the poorest fit), all three methods show a strong relation to the real data. For convienence the SCS Method was chosen and used for quantifying changes in runoff as it is the easiest to adapt to changes in vegetative cover. The SCS Method may over-estimate peak flows; however, if it is consistently applied to present and future watershed conditions, it should yield representative values for the relative reductions which may be expected as a result of improved vegetative cover.

Example Application of SCS Method

After selecting the SCS approach for use in the ES, the method was tested on a small watershed in the Jornada Basin to determine its response to small changes in vegetation. Figure A-9, p. A-80, summarizes present and anticipated future vegetative cover for the small watershed in the Jornada closed basin, and the following Figure A-10, p. A-81, calculates changes in peak flow resulting from the increased cover. Anticipated increases in cover are relatively small (5 percent), with one exception of 12 percent, and infiltration curve numbers are reduced less than 1 percent. Reductions in runoff ranged up to 5 percent as calculated by the SCS Method; and it appeared that the SCS Method is responsive to even small changes in vegetative cover. Similar reductions in surface runoff for other watersheds in the ES Area were calculated in the same manner and are presented in the text. Table A-23, p. A-82, shows the cover values used for Existing Environment and Proposed Action conditions for all eight watersheds.

Table A-23, p. A-82, shows an individual breakdown of each watershed by vegetative type and hydrologic soil group. Cover values are presented for the Existing Environment and the Proposed Action. Conversion factors for the Livestock Adjustment (LA), Pasture Capacity Level (PCL), Enhancement of Sensitive Resource Values (ESR), and No Grazing (NG) Alternatives' cover values are presented below. Cover values for the various alternatives are computed based on the known cover values for the Existing Environment (EE) and the predicted cover for the Proposed Action (PA).

NA = .28(PA-EE) + EE  LA = .7(PA-EE) + EE  PCL = .09(PA) + PA  ESR = PCL  NG = .12(LA) + EE

Table A-23, p. A-82, indicates there are generally small changes in cover values from Existing Environment to Proposed Action. In many cases the cover change was small (3 to 4 percent). For example, in the Rio Grande Large Watershed (Arroyo de Las Canas), there is an Existing Enivronment cover value of 57 for the .2 square miles of creosote in soil type B. For the Livestock Adjustment Alternative (LA) cover = .7(61-57) + 57 = 60.

GENERAL REMARKS

It should be noted that BLM contracted for water quality data collection due to lack of data and manpower. The availability and adequacy of existing monitoring stations for both surface and groundwater data is poor. The USGS currently maintains several monthly monitoring stations along the Rio Grande in addition to three partial recording stations which measure peak flows. There is a definite need for water quality monitoring on a year-round basis in the ES Area. BLM is planning to conduct an on-going water survey in the area in the near future.

FIGURE A-9

METHOD FOR ESTIMATING A SITE SPECIFIC CURVE NUMBER FOR A SMALL WATERSHED
(Example - Jornada Closed Basin)

1. Determine curve numbers from SCS Manual for each vegetative - hydrologic soil group complex. Area, vegetative type, and cover data taken from Table A-23, p. A-82.

| EE | | | | | PA | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Area (Sq.mi) | Veg. /1 Type | Cover | Hydro. /2 Soil Group | SCS Curve Number | Area (Sq.mi) | Veg. /1 Type | Cover | Hydro. /2 Soil Group | SCS Curve Number |
| 0.8 | G | 19 | A | 57.68 | 0.8 | G | 19 | A | 57.68 |
| 2.5 | G | 32 | B | 74.04 | 2.5 | G | 32 | B | 74.04 |
| 1.3 | G | 19 | C | 85.58 | 1.3 | G | 34 | C | 82.88 |
| 0.7 | G | 57 | D | 83.59 | 0.7 | G | 57 | D | 83.59 |
| 0.4 | OS | 28 | B | 82.32 | 0.4 | OS | 33 | B | 82.02 |
| 0.1 | OS | 12 | D | 92.28 | 0.1 | OS | 24 | D | 91.55 |
| 1.1 | CR | 57 | B | 80.58 | 1.1 | CR | 61 | B | 80.34 |
| 0.7 | CR | 61 | C | 86.34 | 0.7 | CR | 64 | C | 86.16 |
| 0.9 | CR | 68 | D | 89.52 | 0.9 | CR | 60 | D | 89.40 |
| 0.1 | HS | 27 | C | 82.38 | 0.1 | HS | 27 | C | 82.38 |
| 8.6 | | | | | 8.6 | | | | |

2. Estimate site specific curve numbers using the following formula:

$$\frac{\text{Area of Vegetative-Hydrologic Soil Group Complex}}{\text{Total Area of Watershed}} \text{ (SCS Curve Number) = Complex Curve Number}$$

**Existing Environment**

$\frac{0.8}{8.6}$ (57.68) = 5.37

$\frac{2.5}{8.6}$ (74.04) = 21.52

$\frac{1.3}{8.6}$ (85.58) = 12.94

$\frac{0.7}{8.6}$ (83.59) = 6.80

$\frac{0.4}{8.6}$ (82.32) = 3.83

$\frac{0.1}{8.6}$ (92.28) = 1.07

$\frac{1.1}{8.6}$ (80.58) = 10.31

$\frac{0.7}{8.6}$ (86.34) = 7.03

$\frac{0.9}{8.6}$ (89.52) = 9.37

$\frac{0.1}{8.6}$ (82.38) = .96

Estimated Site Specific CN = 79.20

**Proposed Action**

$\frac{0.8}{8.6}$ (57.68) = 5.37

$\frac{2.5}{8.6}$ (74.04) = 21.52

$\frac{1.3}{8.6}$ (82.88) = 12.53

$\frac{0.7}{8.6}$ (83.59) = 6.80

$\frac{0.4}{8.6}$ (82.02) = 3.81

$\frac{0.1}{8.6}$ (91.55) = 1.06

$\frac{1.1}{8.6}$ (80.34) = 10.28

$\frac{0.7}{8.6}$ (86.16) = 7.01

$\frac{0.9}{8.6}$ (89.40) = 9.36

$\frac{0.1}{8.6}$ (82.38) = .96

Estimated Site Specific CN = 78.70

/1 PJ - Pinyon-Juniper; CR-Creosote; OS - Desert Shrub; G-Grass; HS - Half Shrub

/2 Hydrologic Soil Groups: As the groups go from A to D, the amount of runoff increases and the amount of infiltration decreases.

Source: BLM Socorro District Files

FIGURE A-10

SCS METHOD FOR CALCULATING PEAK DISCHARGE FROM SMALL UNGAGED WATERSHEDS
(Example: Jornada Small Watershed - Sierra Larga)

1. Estimated site specific curve numbers: taken from Figure A-9, p. A-80.

2. Estimated site specific depth of runoff (Q):
6-hour precipitation data (P) from the NOAA Atlas, for 2-, 5-, 10-, and 25-year flow events; the site specific curve numbers and the following equation were used to estimate site specific depth of runoff (Q).

| 6-Hour Precipitation (P) | |
|---|---|
| 2 year | 1.1 inches |
| 5 year | 1.4 inches |
| 10 year | 1.7 inches |
| 25 year | 2.0 inches |

Where:
CN = Site Specific Curve Number
P = Precipitation (Inches)

$$S = \frac{(1000)}{CN} - 10$$

$$Q = \frac{(P - .2S)^2}{(P + .8S)}$$

$$\text{Second year } Q = \frac{(1.1 - .2S)^2}{(1.1 + .8S)} = .10 \text{ Inches}$$

| | Runoff (Q) | |
|---|---|---|
| | EE | PA |
| 2 year | .10 | .10 inches |
| 5 year | .22 | .21 inches |
| 10 year | .36 | .35 inches |
| 25 year | .53 | .51 inches |

3. Calculated time of concentration ($T_c$ Hours):

Where:
L = Channel Length (Miles)
H = Elevation Difference (Feet)

$$T_c = \frac{(1.9\ L^3)}{H}^{.385}$$

$$T_c \text{ for Jornada Small (Sierra Larga)} = \frac{[1.9\ (4.81)^3]}{720}^{.385} = 1.26 \text{ hours}$$

4. Estimated peak discharge, ($q_p$) in cubic feet per second (cfs)

Where:

$$T_p = 0.67\ T_c$$

A = Area of Watershed

$$q_p = \frac{484\ AQ}{T_p}$$

$$\text{Second year } q_p = \frac{(484)(8.6)(1.1)}{.67(1.26)} = 493 \text{ cfs}$$

Peak discharge for Jornada Small Watershed (Sierra Larga)

| | Peak Discharge ($q_p$) | |
|---|---|---|
| | EE | PA |
| 2 year | 493 | 493 cfs |
| 5 year | 1,085 | 1,035 cfs |
| 10 year | 1,775 | 1,726 cfs |
| 25 year | 2,613 | 2,515 cfs |

Source: BLM Socorro District Files

TABLE A-23

SOIL-VEGETATIVE COVER COMPLEXES

JORNADA CLOSED BASIN

| Small: Sierra Larga Watershed | | | | | Large: Canon Quemado Watershed | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SO MLRA | | | | | SO MLRA | | |
| Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA | Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA |
| 0.8 | G | A | 19 | 19 | 4.4 | PJ | B | 26 | 26 |
| 2.5 | G | B | 32 | 32 | 10.3 | PJ | C | 65 | 65 |
| 1.3 | G | C | 19 | 34 | 1.8 | PJ | D | 38 | 40 |
| 0.7 | G | D | 57 | 57 | 1.9 | G | B | 32 | 32 |
| 0.4 | DS | B | 28 | 33 | 1.5 | G | C | 19 | 34 |
| 0.1 | DS | D | 12 | 24 | 0.6 | G | D | 57 | 57 |
| 1.1 | CR | B | 57 | 61 | 0.2 | DS | C | 19 | 19 |
| 0.7 | CR | C | 61 | 64 | 0.1 | DS | D | 12 | 24 |
| 0.4 | CR | D | 58 | 60 | 0.1 | CR | B | 57 | 61 |
| 0.1 | HS | B | 27 | 27 | 0.3 | CR | D | 58 | 60 |
| 8.6 | | | | | 21.2 | | | | |

RIO PUERCO DRAINAGE

| Small: Rock Tank Watershed | | | | | Large: Coyote Draw Watershed | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | WP-2 MLRA | | | | | WP-3 MLRA | | |
| Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA | Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA |
| 3.1 | PJ | B | 16 | 16 | 8.5 | PJ | B | 44 | 44 |
| 1.4 | PJ | C | 45 | 45 | 32.5 | PJ | C | 63 | 63 |
| 8.4 | PJ | D | 28 | 28 | 3.1 | PJ | D | 49 | 49 |
| 3.2 | G | B | 17 | 36 | 0.4 | SB | C | 20 | 28 |
| 0.4 | G | D | 37 | 37 | 1.2 | DS | C | 50 | 50 |
| 1.5 | DS | B | 24 | 30 | 0.1 | DS | D | 30 | 33 |
| 0.4 | DS | D | 34 | 42 | | | | | |
| 0.3 | WF | C | 23 | 34 | | | | | |
| 0.1 | SG | C | 30 | 30 | | | | | |
| 18.8 | | | | | 45.8 | | | | |

RIO GRANDE TRIBUTARIES

| Small: Arroyo Del Tajo Watershed | | | | | Large: Arroyo De Las Canas Watershed | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | SO MLRA | | | | | SO MLRA | | |
| Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA | Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA |
| 2.1 | PJ | D | 36 | 40 | 2.0 | PJ | B | 26 | 26 |
| 1.7 | CR | A | 32 | 32 | 10.1 | PJ | C | 65 | 65 |
| 0.1 | CR | B | 57 | 61 | 4.9 | PJ | D | 38 | 40 |
| 2.6 | CR | D | 58 | 60 | 0.3 | CR | A | 32 | 32 |
| 0.1 | DS | A | 23 | 23 | 0.2 | CR | B | 57 | 61 |
| 0.5 | DS | B | 28 | 33 | 3.6 | CR | C | 61 | 64 |
| 0.2 | DS | D | 12 | 24 | 0.9 | CR | D | 58 | 60 |
| | | | | | 0.1 | DS | A | 23 | 23 |
| | | | | | 0.2 | DS | B | 28 | 33 |
| | | | | | 0.5 | DS | C | 19 | 19 |
| | | | | | 1.4 | DS | D | 12 | 24 |
| | | | | | 0.6 | HS | B | 27 | 27 |
| | | | | | 0.4 | G | C | 19 | 24 |
| | | | | | 0.1 | G | D | 57 | 57 |
| 7.3 | | | | | 25.3 | | | | |

RIO SALADO DRAINAGE

| Small: Ladron Mountain Watershed | | | | | Large: Canada Bonita Watershed | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | WP-2 MLRA | | | | | WP-3 MLRA | | |
| Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA | Area (Sq.Mi.) | Veg. Type | Soil Group | Cover Values EE | Cover Values PA |
| 1.8 | PJ | B | 44 | 44 | 1.8 | PJ | B | 16 | 16 |
| 6.1 | PJ | C | 63 | 63 | 1.1 | PJ | C | 45 | 45 |
| 4.4 | PJ | D | 49 | 49 | 15.5 | PJ | D | 28 | 28 |
| 0.1 | SB | D | 9 | 9 | 2.3 | G | B | 17 | 36 |
| | | | | | 1.7 | G | D | 37 | 37 |
| | | | | | 0.9 | SB | B | 15 | 21 |
| | | | | | 0.2 | SB | D | 16 | 25 |
| | | | | | 0.1 | DS | B | 24 | 30 |
| | | | | | 2.3 | DS | D | 34 | 42 |
| | | | | | 0.5 | SG | D | 30 | 30 |
| 12.4 | | | | | 26.4 | | | | |

PJ-Pinyon-juniper; CR-Creosote; DS-Desert Shrub; G-Grass; HS-Half-Shrub; SB-Saltbush; SG-Sagebrush; WF-Winterfat

Hydrologic Soil Groups: As the groups go from A to D, the amount of runoff increases and the amount of infiltration decreases.

Source: BLM Socorro District Files and Range Survey

# APPENDIX 5

LIVESTOCK GRAZING

Page

Table A-24 Ranch Size and Use Levels for Existing, Proposed Action, and Alternatives A-83

TABLE A-24

RANCH SIZE AND USE LEVELS FOR EXISTING, PROPOSED ACTION AND ALTERNATIVES /1



| Ranch /2 | EE Short & Long Term | R C | PA Short Term | R C | PA Long Term | R C | NA/FE Short Term | R C | NA/FE Long Term | R C | LA Short Term | R C | LA Long Term | R C | PCL Short Term | R C | PCL Long Term | R C | ESR Short Term | R C | ESR Long Term | R C | NG Short & Long Term | R C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 002 | 5,352 | | 2,632 | | 3,463 | | 5,352 | | 5,352 | | 2,632 | | 3,341 | | 1,911 | | 4,246 | | 1,772 | | 4,280 | | 3,576 | |
| 086 | 2,832 | | 2,832 | | 3,522 | | 2,832 | | 2,832 | | 2,832 | | 3,286 | | 2,329 | | 4,332 | | 2,013 | | 4,332 | | 492 | |
| 301 | 6,129 | | 3,559 | | 5,502 | | 6,129 | | 6,129 | | 3,559 | | 5,050 | | 2,584 | | 6,750 | | 2,584 | | 6,750 | | 3,009 | |
| 325 | 2,592 | | 1,485 | | 2,331 | | 2,592 | | 2,592 | | 1,485 | | 2,154 | | 1,020 | | 2,856 | | 976 | | 2,863 | | 882 | |
| TOTAL | 16,905 | H | 10,508 | H | 14,818 | H | 16,905 | H | 16,905 | H | 10,508 | H | 13,831 | H | 7,844 | H | 18,184 | H | 7,345 | H | 18,225 | H | 7,959 | H |
| 006 /3 | 824 | B | 739 | B | 1,049 | C | 824 | B | 824 | B | 739 | B | 1,049 | C | 557 | B | 1,288 | C | 496 | B | 1,288 | C | 104 | A |
| 006 /3 | 824 | B | 739 | B | 1,049 | C | 824 | B | 824 | B | 739 | B | 1,049 | C | 557 | B | 1,288 | C | 496 | B | 1,288 | C | 104 | A |
| 012 /3 | 36 | A | 24 | A | 30 | A | 36 | A | 36 | A | 24 | A | 29 | A | 24 | A | 30 | A | 24 | A | 30 | A | 0 | - |
| 012 /3 | 60 | A | 41 | A | 51 | A | 60 | A | 60 | A | 41 | A | 49 | A | 41 | A | 51 | A | 41 | A | 51 | A | 0 | - |
| 016 | 2,358 | | 2,254 | | 4,227 | | 2,358 | | 2,358 | | 2,254 | | 3,878 | | 1,703 | | 5,208 | | 1,627 | | 5,225 | | 1,098 | |
| 017 /1 | 4,842 | | 4,605 | | 4,605 | | 4,842 | | 4,842 | | 4,605 | | 4,605 | | 4,605 | | 4,605 | | 4,605 | | 4,605 | | 4,434 | |
| TOTAL | 7,200 | H | 6,859 | H | 8,832 | H | 7,200 | H | 7,200 | H | 6,859 | H | 8,483 | H | 6,308 | H | 9,813 | H | 6,232 | H | 9,830 | H | 5,532 | G |
| 036 | 1,200 | | 1,200 | | 1,022 | | 1,200 | | 1,022 | | 1,200 | | 1,022 | | 932 | | 1,248 | | 731 | | 1,282 | | 24 | |
| 037 /3 | 1,728 | | 920 | | 1,066 | | 1,728 | | 1,728 | | 920 | | 1,029 | | 611 | | 1,310 | | 523 | | 1,310 | | 264 | |
| TOTAL | 2,928 | F | 2,120 | E | 2,088 | E | 2,928 | F | 2,750 | F | 2,120 | E | 2,051 | E | 1,543 | D | 2,558 | F | 1,254 | C | 2,592 | F | 288 | A |
| 037 /3 | 564 | B | 432 | B | 501 | B | 564 | B | 564 | B | 432 | B | 484 | B | 288 | A | 616 | B | 246 | A | 616 | B | 84 | A |
| 052 | 216 | A | 78 | A | 219 | A | 216 | A | 216 | A | 78 | A | 181 | A | 78 | A | 219 | A | 0 | - | 219 | A | 84 | A |
| 058 | 756 | B | 534 | B | 613 | B | 534 | B | 613 | B | 534 | B | 616 | B | 534 | B | 613 | B | 534 | B | 613 | B | 132 | A |
| 059 | 3,228 | F | 1,762 | D | 4,893 | G | 1,762 | D | 4,893 | G | 1,762 | D | 4,898 | G | 1,497 | D | 6,000 | H | 1,351 | D | 6,000 | H | 1,236 | C |
| 065 | 3,636 | F | 2,831 | F | 3,404 | F | 2,831 | F | 3,404 | F | 2,831 | F | 3,404 | F | 2,088 | E | 4,175 | G | 2,088 | E | 4,176 | G | 2,256 | E |
| 077 | 552 | B | 191 | A | 235 | A | 191 | A | 235 | A | 191 | A | 235 | A | 101 | A | 297 | A | 54 | A | 318 | A | 132 | A |
| 081 /3 | 325 | A | 325 | A | 348 | A | 325 | A | 348 | A | 325 | A | 349 | A | 234 | A | 426 | B | 234 | A | 426 | B | -0- | - |
| 081 /3 | 623 | B | 623 | B | 675 | B | 623 | B | 675 | B | 623 | B | 677 | B | 455 | B | 826 | B | 455 | B | 826 | B | 48 | A |
| 083 | 72 | | 64 | | 64 | | 72 | | 72 | | 64 | | 64 | | 64 | | 64 | | 64 | | 64 | | -0- | |
| 165 /1 | 240 | | 236 | | 236 | | 240 | | 240 | | 236 | | 236 | | 236 | | 236 | | 236 | | 236 | | 228 | |
| TOTAL | 312 | A | 300 | A | 300 | A | 312 | A | 312 | A | 300 | A | 300 | A | 300 | A | 300 | A | 300 | A | 300 | A | 228 | A |
| 089 | 96 | | 43 | | 57 | | 96 | | 96 | | 43 | | 53 | | 43 | | 57 | | 43 | | 57 | | 48 | |
| 090 | 2,100 | | 959 | | 1,753 | | 2,100 | | 2,100 | | 959 | | 1,598 | | 647 | | 2,150 | | 392 | | 2,183 | | 672 | |
| TOTAL | 2,196 | E | 1,002 | C | 1,810 | E | 2,196 | E | 2,196 | E | 1,002 | C | 1,651 | D | 690 | B | 2,207 | E | 435 | B | 2,240 | E | 720 | B |
| 091 | 732 | B | 478 | B | 672 | B | 478 | B | 672 | B | 478 | B | 674 | B | 389 | B | 823 | B | 389 | B | 823 | B | 12 | A |
| 113 /1 | 36 | A | 19 | A | 19 | A | 36 | A | 36 | A | 19 | A | 19 | A | 19 | A | 19 | A | 0 | - | 43 | A | 0 | - |
| 114 | 6,899 | H | 4,640 | G | 6,522 | H | 6,899 | H | 6,899 | H | 4,640 | G | 6,176 | H | 3,850 | G | 7,998 | H | 3,803 | G | 8,008 | H | 4,302 | G |

TABLE A-24 (continued)

RANCH SIZE AND USE LEVELS FOR EXISTING, PROPOSED ACTION AND ALTERNATIVES /1



| | EE | | PA | | | | NA/FE | | | | LA | | | | PCL | | | | ESR | | | | NG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranch /2 | Short & Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short & Long Term | R C |
| 121 | 1,032 | | 848 | | 1,337 | | 848 | | 1,337 | | 848 | | 1,331 | | 848 | | 1,337 | | 848 | | 1,337 | | 123 | |
| 354 /1 | 24 | | 0 | | 0 | | 24 | | 24 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | | 0 | |
| TOTAL | 1,056 | C | 848 | C | 1,337 | D | 872 | C | 1,361 | D | 848 | C | 1,331 | D | 848 | C | 1,337 | D | 848 | C | 1,337 | D | 123 | A |
| 122 | 720 | B | 310 | A | 452 | B | 310 | A | 452 | B | 310 | A | 452 | B | 310 | A | 452 | B | 75 | A | 538 | B | 372 | B |
| 129 | 8,165 | H | 6,340 | H | 9,465 | H | 6,340 | H | 9,465 | H | 6,340 | H | 9,467 | H | 5,198 | G | 11,703 | H | 2,909 | F | 12,145 | H | 4,109 | G |
| 131 /3 | 780 | B | 407 | B | 612 | B | 780 | B | 780 | B | 407 | B | 561 | B | 288 | A | 752 | B | 288 | A | 752 | B | 540 | B |
| 131 /3 | 780 | B | 407 | B | 612 | B | 780 | B | 780 | B | 407 | B | 561 | B | 288 | A | 752 | B | 288 | A | 752 | B | 540 | B |
| 134 /1 | 5,400 | G | 5,369 | G | 5,369 | G | 5,400 | G | 5,400 | G | 5,369 | G | 5,369 | G | 5,369 | G | 5,369 | G | 5,369 | G | 5,369 | G | 5,292 | G |
| 143 /1 | 180 | A | 157 | A | 157 | A | 180 | A | 180 | A | 157 | A | 157 | A | 157 | A | 157 | A | 157 | A | 157 | A | 144 | A |
| 145 /1 | 8,880 | H | 8,586 | H | 8,586 | H | 8,880 | H | 8,880 | H | 8,586 | H | 8,586 | H | 8,586 | H | 8,586 | H | 8,586 | H | 8,586 | H | 8,244 | H |
| 152 | 3,596 | F | 2,856 | F | 4,092 | G | 3,596 | F | 3,596 | F | 2,856 | F | 3,797 | G | 2,147 | E | 5,005 | G | 2,098 | E | 5,005 | G | 2,475 | F |
| 250 /3 | 216 | A | 61 | A | 81 | A | 216 | A | 216 | A | 61 | A | 79 | A | 56 | A | 104 | A | 15 | A | 114 | A | 24 | A |
| 250 /3 | 324 | A | 204 | A | 257 | A | 324 | A | 324 | A | 204 | A | 251 | A | 177 | A | 327 | A | 48 | A | 360 | B | 94 | A |
| 250 /3 | 528 | B | 250 | A | 288 | A | 528 | B | 528 | B | 250 | A | 281 | A | 198 | A | 367 | B | 53 | A | 404 | B | 47 | A |
| 251 | 3,468 | | 2,295 | | 3,756 | | 3,468 | | 3,468 | | 2,295 | | 3,408 | | 1,537 | | 4,605 | | 1,537 | | 4,605 | | 2,040 | |
| 252 | 2,377 | | 1,684 | | 2,515 | | 2,377 | | 2,377 | | 1,684 | | 2,323 | | 1,509 | | 3,100 | | 1,490 | | 3,104 | | 411 | |
| 275 | 12,384 | | 7,649 | | 11,256 | | 12,384 | | 12,384 | | 7,649 | | 10,329 | | 5,833 | | 13,846 | | 5,453 | | 13,792 | | 7,356 | |
| TOTAL | 18,229 | H | 11,628 | H | 17,527 | H | 18,229 | H | 18,229 | H | 11,628 | H | 16,060 | H | 8,879 | H | 21,551 | H | 8,480 | H | 21,501 | H | 9,807 | H |
| 253 | 288 | A | 204 | A | 352 | A | 204 | A | 352 | A | 204 | A | 352 | A | 204 | A | 352 | A | 149 | A | 388 | B | 0 | - |
| 254 | 3,276 | F | 1,764 | D | 3,116 | F | 1,764 | D | 3,116 | F | 1,764 | D | 3,118 | F | 1,764 | D | 3,116 | F | 565 | B | 4,204 | G | 564 | B |
| 255 | 384 | | 284 | | 409 | | 284 | | 409 | | 284 | | 409 | | 284 | | 409 | | 0 | | 627 | | 72 | |
| 256 | 2,004 | | 1,474 | | 2,024 | | 1,474 | | 2,024 | | 1,474 | | 2,026 | | 1,019 | | 2,492 | | 967 | | 2,500 | | 374 | |
| TOTAL | 2,388 | E | 1,758 | D | 2,433 | F | 1,758 | D | 2,433 | F | 1,758 | D | 2,435 | F | 1,303 | C | 2,901 | F | 967 | C | 3,127 | F | 446 | B |
| 258 | 1,116 | C | 965 | C | 1,199 | C | 1,116 | C | 1,116 | C | 965 | C | 1,139 | C | 482 | B | 1,472 | D | 200 | A | 1,617 | D | 380 | B |
| 260 | 3,360 | | 1,678 | | 2,639 | | 3,360 | | 3,360 | | 1,678 | | 2,392 | | 1,390 | | 3,248 | | 1,065 | | 3,303 | | 1,242 | |
| 310 /1 | 6,576 | | 6,521 | | 6,521 | | 6,576 | | 6,576 | | 6,521 | | 6,521 | | 6,521 | | 6,521 | | 6,521 | | 6,521 | | 6,375 | |
| 360 | 624 | | 628 | | 757 | | 624 | | 624 | | 628 | | 725 | | 628 | | 757 | | 628 | | 757 | | 325 | |
| TOTAL | 10,560 | H | 8,827 | H | 9,917 | H | 10,560 | H | 10,560 | H | 8,827 | H | 9,638 | H | 8,539 | H | 10,526 | H | 8,214 | H | 10,581 | H | 7,942 | H |
| 261 | 2,705 | F | 2,705 | F | 2,330 | E | 2,705 | F | 2,330 | E | 2,705 | F | 2,332 | E | 2,540 | F | 2,865 | F | 1,736 | D | 3,339 | F | 519 | B |
| 262 | 2,940 | F | 2,105 | E | 2,841 | F | 2,940 | F | 2,940 | F | 2,105 | E | 2,664 | F | 1,444 | D | 3,499 | F | 1,444 | D | 3,659 | F | 1,382 | D |
| 263 | 2,066 | E | 1,893 | E | 2,987 | F | 2,066 | E | 2,066 | E | 1,893 | E | 2,797 | F | 1,893 | E | 2,987 | F | 601 | B | 2,987 | F | 620 | B |
| 264 /3 | 564 | B | 447 | B | 654 | B | 564 | B | 564 | B | 447 | B | 612 | B | 447 | B | 654 | B | 442 | B | 688 | B | 71 | A |

TABLE A-24 (continued)

RANCH SIZE AND USE LEVELS FOR EXISTING, PROPOSED ACTION AND ALTERNATIVES /1



| Ranch /2 | EE | | PA | | | | NA/FE | | | | LA | | | | PCL | | | | ESR | | | | NG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Short & Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short & Long Term | R C |
| 264 /3 | 660 | B | 699 | B | 1,022 | C | 660 | B | 660 | B | 699 | B | 958 | C | 699 | B | 1,022 | C | 692 | B | 1,075 | C | 177 | A |
| 266 | 1,764 | O | 1,282 | C | 2,006 | E | 1,764 | D | 1,764 | D | 1,282 | C | 1,831 | E | 956 | C | 2,465 | F | 956 | C | 2,465 | F | 252 | A |
| 267 /1 | 3,564 | F | 3,462 | F | 3,462 | F | 3,564 | F | 3,564 | F | 3,462 | F | 3,462 | F | 3,462 | F | 3,462 | F | 3,462 | F | 3,462 | F | 3,144 | F |
| 268 /3 | 4,320 | G | 1,947 | E | 6,423 | H | 4,320 | G | 4,320 | G | 1,947 | E | 5,601 | G | 1,500 | D | 7,871 | H | 1,440 | D | 7,884 | H | 1,251 | C |
| 268 /3 | 1,200 | | 582 | | 1,918 | | 1,200 | | 1,200 | | 582 | | 1,673 | | 448 | | 2,351 | | 430 | | 2,355 | | 240 | |
| 323 | 1,800 | | 1,912 | | 2,913 | | 1,800 | | 1,800 | | 1,912 | | 2,691 | | 1,006 | | 2,913 | | 1,006 | | 2,958 | | 828 | |
| 355 /1 | 2,328 | | 2,467 | | 2,467 | | 2,328 | | 2,328 | | 2,467 | | 2,467 | | 2,467 | | 2,467 | | 2,467 | | 2,467 | | 2,035 | |
| TOTAL | 5,328 | G | 4,961 | G | 7,298 | H | 5,328 | G | 5,328 | G | 4,961 | G | 6,831 | H | 3,921 | G | 7,731 | H | 3,903 | G | 7,780 | H | 3,103 | F |
| 271 /3 | 924 | C | 507 | B | 615 | B | 924 | C | 924 | C | 507 | B | 587 | B | 408 | B | 755 | B | 408 | B | 755 | B | 240 | A |
| 271 /3 | 3,024 | | 2,309 | | 2,799 | | 3,024 | | 3,024 | | 2,309 | | 2,676 | | 1,861 | | 3,441 | | 1,861 | | 3,438 | | 1,418 | |
| 340 /1 | 2,028 | | 1,888 | | 1,888 | | 2,028 | | 2,028 | | 1,888 | | 1,888 | | 1,888 | | 1,888 | | 1,888 | | 1,888 | | 1,636 | |
| TOTAL | 5,052 | G | 4,197 | G | 4,687 | G | 5,052 | G | 5,052 | G | 4,197 | G | 4,564 | G | 3,749 | G | 5,329 | G | 3,749 | G | 5,326 | G | 3,054 | F |
| 272 | 4,095 | G | 4,206 | G | 5,168 | G | 4,095 | G | 4,095 | G | 4,206 | G | 4,921 | G | 3,806 | G | 6,316 | H | 3,806 | G | 6,316 | H | 459 | B |
| 276 | 557 | | 310 | | 438 | | 557 | | 557 | | 310 | | 405 | | 310 | | 438 | | 310 | | 438 | | 144 | |
| 361 /1 | 5,443 | | 5,361 | | 5,361 | | 5,443 | | 5,443 | | 5,361 | | 5,361 | | 5,361 | | 5,361 | | 5,361 | | 5,361 | | 5,328 | |
| TOTAL | 6,000 | H | 5,671 | G | 5,799 | G | 6,000 | H | 6,000 | H | 5,671 | G | 5,766 | G | 5,671 | G | 5,799 | G | 5,671 | G | 5,799 | G | 5,472 | G |
| 277 | 2,244 | E | 1,691 | D | 2,302 | E | 2,244 | E | 2,244 | E | 1,691 | D | 2,180 | E | 1,151 | C | 2,822 | F | 371 | B | 3,117 | F | 83 | A |
| 279 | 1,500 | D | 1,500 | D | 1,544 | D | 1,500 | D | 1,544 | D | 1,500 | O | 1,544 | D | 1,411 | D | 1,896 | E | 1,296 | C | 1,958 | E | 163 | A |
| 280 | 3,048 | | 1,518 | | 2,893 | | 3,048 | | 3,048 | | 1,518 | | 2,578 | | 1,137 | | 3,570 | | 1,137 | | 3,570 | | 975 | |
| 358 /1 | 3,480 | | 3,425 | | 3,425 | | 3,480 | | 3,480 | | 3,425 | | 3,425 | | 3,425 | | 3,425 | | 3,425 | | 3,425 | | 3,110 | |
| TOTAL | 6,528 | H | 4,943 | G | 6,318 | H | 6,528 | H | 6,528 | H | 4,943 | G | 6,003 | H | 4,562 | G | 6,995 | H | 4,562 | G | 6,995 | H | 4,085 | G |
| 281 /1 | 3,552 | F | 3,270 | F | 3,270 | F | 3,552 | F | 3,552 | F | 3,270 | F | 3,270 | F | 3,270 | F | 3,270 | F | 3,270 | F | 3,270 | F | 2,367 | E |
| 282 /1 | 924 | C | 903 | C | 903 | C | 924 | C | 924 | C | 903 | C | 903 | C | 903 | C | 903 | C | 903 | C | 903 | C | 864 | C |
| 283 | 2,941 | F | 1,740 | D | 2,652 | F | 1,740 | D | 2,652 | F | 1,740 | D | 2,655 | F | 1,277 | C | 3,279 | F | 1,277 | C | 3,279 | F | 765 | B |
| 284 | 1,992 | E | 1,050 | C | 1,494 | D | 1,992 | E | 1,992 | E | 1,050 | C | 1,391 | D | 802 | B | 1,835 | E | 802 | B | 1,835 | E | 552 | B |
| 285 | 2,449 | F | 2,226 | E | 3,636 | F | 2,449 | F | 2,449 | F | 2,226 | E | 3,361 | F | 2,226 | E | 3,633 | F | 1,076 | C | 4,284 | G | 539 | B |
| 286 | 16 | A | -0- | - | -0- | - | 16 | A | 16 | A | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - |
| 287 | 312 | A | 186 | A | 342 | A | 186 | A | 342 | A | 186 | A | 342 | A | 93 | A | 443 | B | 61 | A | 453 | B | 48 | A |
| 288 | 804 | B | 241 | A | 299 | A | 241 | A | 299 | A | 241 | A | 299 | A | 121 | A | 368 | B | 44 | A | 407 | B | 492 | B |
| 289 /3 | 108 | A | 108 | A | 175 | A | 108 | A | 175 | A | 108 | A | 175 | A | 79 | A | 214 | A | 79 | A | 214 | A | 15 | A |
| 289 /3 | 324 | A | 324 | A | 499 | B | 324 | A | 499 | B | 324 | A | 499 | B | 226 | A | 611 | B | 226 | A | 611 | B | 16 | A |
| 289 /3 | 540 | B | 540 | B | 823 | B | 540 | B | 823 | B | 540 | B | 824 | B | 373 | B | 1,009 | C | 373 | B | 1,007 | C | 238 | A |

TABLE A-24 (continued)

RANCH SIZE AND USE LEVELS FOR EXISTING, PROPOSED ACTION ANO ALTERNATIVES /1



| | EE | | PA | | | | NA/FE | | | | LA | | | | PCL | | | | ESR | | | | NG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranch /2 | Short & Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short Term | R C | Long Term | R C | Short & Long Term | R C |
| 289 /3 | 648 | 8 | 648 | B | 998 | C | 648 | B | 998 | C | 648 | B | 999 | C | 452 | B | 1,222 | C | 452 | B | 1,221 | C | 9 | A |
| 290 | 2,208 | E | 2,287 | E | 3,564 | F | 2,208 | E | 2,208 | E | 2,287 | E | 3,358 | F | 2,287 | E | 3,564 | F | 2,287 | E | 3,564 | F | 864 | C |
| 291 | 1,716 | 0 | 1,199 | C | 1,891 | E | 1,716 | 0 | 1,716 | D | 1,199 | C | 1,713 | D | 824 | B | 2,320 | E | 824 | B | 2,318 | E | 180 | A |
| 293 | 6,264 | H | 6,106 | H | 8,120 | H | 6,264 | H | 6,264 | H | 6,106 | H | 7,607 | H | 5,217 | G | 9,943 | H | 3,708 | F | 9,941 | H | 814 | B |
| 294 | 1,274 | C | 1,332 | D | 1,453 | 0 | 1,274 | C | 1,274 | C | 1,332 | 0 | 1,422 | D | 1,332 | D | 1,453 | 0 | 480 | B | 1,793 | D | 688 | B |
| 295 | 2,720 | | 1,230 | | 1,398 | | 2,720 | | 2,720 | | 1,230 | | 1,354 | | 1,230 | | 1,396 | | 1,230 | | 1,395 | | 1,724 | |
| 345 | 4,120 | | 3,955 | | 3,955 | | 4,120 | | 4,120 | | 3,955 | | 3,955 | | 3,955 | | 3,955 | | 3,955 | | 3,955 | | 3,917 | |
| TOTAL | 6,840 | H | 5,185 | G | 5,353 | G | 6,840 | H | 6,840 | H | 5,185 | G | 5,309 | G | 5,185 | G | 5,351 | G | 5,185 | G | 5,350 | G | 5,641 | G |
| 296 /1 | 6,000 | H | 6,095 | H | 6,095 | H | 6,000 | H | 6,000 | H | 6,095 | H | 6,095 | H | 6,095 | H | 6,095 | H | 6,095 | H | 6,095 | H | 5,259 | G |
| 297 | 1,541 | D | 452 | B | 1,305 | C | 452 | B | 1,305 | C | 452 | B | 1,305 | C | 301 | A | 1,667 | D | 131 | A | 1,679 | 0 | 308 | A |
| 298 | 1,572 | | 801 | | 1,147 | | 1,572 | | 1,572 | | 801 | | 1,057 | | 601 | | 1,406 | | 601 | | 1,406 | | 936 | |
| 330 | 1,236 | | 940 | | 1,436 | | 1,236 | | 1,236 | | 940 | | 1,317 | | 940 | | 1,436 | | 940 | | 1,436 | | 768 | |
| TOTAL | 2,808 | F | 1,741 | 0 | 2,583 | F | 2,808 | F | 2,808 | F | 1,741 | D | 2,374 | E | 1,541 | D | 2,842 | F | 1,541 | 0 | 2,842 | F | 1,704 | 0 |
| 299 | 481 | B | 413 | B | 714 | B | 481 | B | 481 | B | 413 | B | 695 | B | 204 | A | 885 | C | 204 | A | 885 | C | 58 | A |
| 300 | 720 | B | 720 | B | 1,025 | C | 720 | B | 1,025 | C | 720 | B | 1,028 | C | 531 | B | 1,254 | C | 531 | B | 1,254 | C | 402 | B |
| 302 | 48 | A | -0- | - | -0- | - | 48 | A | 48 | A | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - |
| 303 | 120 | A | 78 | A | 125 | A | 120 | A | 120 | A | 78 | A | 113 | A | 78 | A | 125 | A | 78 | A | 125 | A | 44 | A |
| 306 | 528 | B | 244 | A | 322 | A | 528 | B | 528 | B | 244 | A | 318 | A | 244 | A | 322 | A | 244 | A | 322 | A | 84 | A |
| 308 /3 | 264 | A | 81 | A | 96 | A | 264 | A | 264 | A | 81 | A | 92 | A | 40 | A | 122 | A | 19 | A | 133 | A | 119 | A |
| 308 /3 | 192 | A | 81 | A | 96 | A | 192 | A | 192 | A | 81 | A | 92 | A | 40 | A | 122 | A | 19 | A | 133 | A | 48 | A |
| 311 | 24 | A | -0- | - | -0- | - | 24 | A | 24 | A | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - |
| 312 | 864 | C | 337 | A | 592 | B | 337 | A | 592 | B | 337 | A | 592 | B | 225 | A | 739 | B | 0 | - | 832 | B | 12 | A |
| 315 /3 | 23 | A | 0 | - | 65 | A | 23 | A | 23 | A | 0 | - | 55 | A | 0 | - | 65 | A | 0 | - | 85 | A | 0 | - |
| 315 /3 | 96 | A | 68 | A | 527 | B | 96 | A | 96 | A | 68 | A | 446 | B | 68 | A | 527 | B | 0 | - | 685 | B | 13 | A |
| 317 | 425 | B | 104 | A | 196 | A | 104 | A | 196 | A | 104 | A | 196 | A | 104 | A | 196 | A | 0 | - | 309 | A | 140 | A |
| 318 /3 | 36 | A | 48 | A | 59 | A | 48 | A | 59 | A | 48 | A | 59 | A | 48 | A | 72 | A | 20 | A | 73 | A | 0 | - |
| 318 /3 | 348 | A | 244 | A | 307 | A | 244 | A | 307 | A | 244 | A | 307 | A | 244 | A | 380 | B | 102 | A | 381 | B | 14 | A |
| 321 | 1,608 | | 843 | | 1,337 | | 1,608 | | 1,608 | | 843 | | 1,208 | | 420 | | 1,657 | | 420 | | 1,657 | | 949 | |
| 351 /1 | 2,316 | | 2,236 | | 2,236 | | 2,316 | | 2,316 | | 2,236 | | 2,236 | | 2,236 | | 2,236 | | 2,236 | | 2,236 | | 2,088 | |
| TOTAL | 3,924 | G | 3,079 | F | 3,903 | G | 3,924 | G | 3,924 | G | 3,079 | F | 3,444 | F | 2,656 | F | 3,893 | G | 2,656 | F | 3,893 | G | 3,037 | F |

TABLE A-24 (continued)

RANCH SIZE AND USE LEVELS FOR EXISTING, PROPOSED ACTION AND ALTERNATIVES /1



| | EE | | PA | | | | NA/FE | | | | LA | | | | PCL | | | | ESR | | | | NG | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ranch /2 | Short & Long Term | RC | Short Term | RC | Long Term | RC | Short Term | RC | Long Term | RC | Short Term | RC | Long Term | RC | Short Term | RC | Long Term | RC | Short Term | RC | Long Term | RC | Short & Long Term | RC |
| 322 | 2,244 | E | 1,900 | E | 2,593 | F | 2,244 | E | 2,244 | E | 1,900 | E | 2,421 | F | 1,265 | C | 3,256 | F | 854 | C | 3,342 | F | 986 | C |
| 327 | 2,220 | E | 971 | C | 1,467 | O | 2,220 | E | 2,220 | E | 971 | C | 1,336 | O | 768 | B | 1,822 | E | 677 | B | 1,842 | E | 1,185 | C |
| 328 | 1,189 | C | 1,013 | C | 1,770 | O | 1,189 | C | 1,189 | C | 1,013 | C | 1,580 | O | 1,013 | C | 1,770 | O | 1,013 | C | 1,770 | O | 309 | A |
| 341 /1 | 23 | A | 11 | A | 11 | A | 23 | A | 23 | A | 11 | A | 11 | A | 11 | A | 11 | A | 11 | A | 11 | A | -0- | - |
| 342 /1 | 3,132 | F | 3,056 | F | 3,056 | F | 3,132 | F | 3,132 | F | 3,056 | F | 3,056 | F | 3,056 | F | 3,056 | F | 3,056 | F | 3,056 | F | 2,832 | F |
| 343 /1 | 5,400 | G | 5,277 | G | 5,277 | G | 5,400 | G | 5,400 | G | 5,277 | G | 5,277 | G | 5,277 | G | 5,277 | G | 5,277 | G | 5,277 | G | 5,133 | G |
| 347 | 84 | A | 17 | A | 35 | A | 84 | A | 84 | A | 17 | A | 30 | A | 17 | A | 35 | A | 17 | A | 35 | A | -0- | - |
| 348 | 407 | B | 146 | A | 293 | A | 407 | B | 407 | B | 146 | A | 255 | A | 146 | A | 293 | A | 146 | A | 293 | A | -0- | - |
| 350 | | | | | | | | | | | | | | | | | | | | | | | | |
| 362 /1 | 6,588 | | 6,552 | | 6,552 | | 6,588 | | 6,588 | | 6,552 | | 6,552 | | 6,552 | | 6,552 | | 6,552 | | 6,552 | | 6,326 | |
| 349 | 228 | | 81 | | 199 | | 228 | | 228 | | 81 | | 168 | | 81 | | 199 | | 81 | | 199 | | 0 | |
| TOTAL | 6,816 | H | 6,633 | H | 6,751 | H | 6,816 | H | 6,816 | H | 6,633 | H | 6,720 | H | 6,633 | H | 6,751 | H | 6,633 | H | 6,751 | H | 6,326 | H |
| 352 /1 | 1,680 | O | 1,489 | O | 1,489 | O | 1,680 | O | 1,680 | O | 1,489 | O | 1,489 | O | 1,489 | O | 1,489 | O | 1,489 | D | 1,489 | O | 1,056 | C |
| 353 /1 | 744 | B | 601 | B | 601 | B | 744 | B | 744 | B | 601 | B | 601 | B | 601 | B | 601 | B | 601 | B | 601 | B | 468 | B |
| 356 /1 | 72 | A | -0- | - | 83 | A | 72 | A | 72 | A | -0- | - | 83 | A | -0- | - | 83 | A | -0- | - | 83 | A | -0- | - |
| 357 | 24 | A | -0- | - | -0- | - | 24 | A | 24 | A | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - | -0- | - |
| TOTALS | 240,977 | | 189,646 | | 246,344 | | 229,305 | | 242,403 | | 189,646 | | 236,689 | | 167,172 | | 278,196 | | 152,086 | | 283,180 | | 132,068 | |
| Percent Change from Existing Environment | | | -21% | | +2% | | -5% | | +.6% | | -21% | | -2% | | -31% | | +15% | | -37% | | +18% | | -45% | |

/1 On non-AMP areas, non-public land AUMs were estimated in order to calculate ranch size categories
/2 Totals of individual allotments are calculated by operator
/3 Community allotments with two or more operators

A = Subsistence Small (1-29 AUs)
B = Subsistence Large (30-69 AUs)
C = Small Commercial Small (70-110 AUs)
O = Small Commercial Medium (111-150 AUs)
E = Small Commercial Large (151-199 AUs)
F = Medium Commercial Small (200-309 AUs)
G = Medium Commercial Large (310-499 AUs)
H = Large (500 or more AUs)

EE - Existing Environment
PA - Proposed Action
NA/FE - No Action Alternative and Future Environment
LA - Livestock Adjustment Alternative
PCL - Pasture Capacity Level Alternative
ESR - Enhancement of Sensitive Resource Values Alternative
NG - No Grazing Alternative
RC - Ranch Size Categories

Source: Table A-1, Table A-18, Range Survey, Wildlife Data, Socorro District

# APPENDIX 6

SOCIO-ECONOMICS


| | Page |
|---|---|
| Methodology | A-88 |
| Table A-25 Grazing Dependency by Ranch Category, 1975 | A-88 |
| Figure A-11 Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Proposed Action | A-89 |
| Figure A-12 Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the No Action Alternative | A-89 |
| Figure A-13 Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Livestock Adjustment Alternative | A-90 |
| Figure A-14 Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Pasture Capacity Level Alternative | A-90 |
| Figure A-15 Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the Enhancement of Sensitive Resource Values Alternative | A-91 |
| Figure A-16 Short- and Long-Term Changes in the Distribution of Number of Operators in Ranch Size Categories Under the No Grazing Alternative | A-91 |
| Table A-26 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Existing Environment | A-92 |
| Table A-27 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Proposed Action and Livestock Adjustment Alternative in the Short Term | A-93 |
| Table A-28 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Action Alternative in the Short Term | A-94 |

SOCIO-ECONOMICS (continued)


| | Page |
|---|---|
| Table A-29 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Pasture Capacity Level Alternative in the Short Term | A-95 |
| Table A-30 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for the Enhancement of Sensitive Resource Values Alternative in the Short Term | A-96 |
| Table A-31 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Grazing Alternative in the Short Term | A-97 |
| Table A-32 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Proposed Action in the Long Term | A-98 |
| Table A-33 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Action Alternative in the Long Term | A-99 |
| Table A-34 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Livestock Adjustment Alternative in the Long Term | A-100 |
| Table A-35 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Pasture Capacity Level Alternative in the Long Term | A-101 |
| Table A-36 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for Enhancement of Sensitive Resource Values Alternative in the Long Term | A-102 |
| Table A-37 Estimated Receipts, Costs, and Net Returns per Ranch Size Category for No Grazing Alternative in the Long Term | A-103 |

Methodology

The socio-economic analysis of the impact area is based on studies contracted by BLM to Southwest Research and Oevelopment Company (SRO) (1977). A more detailed explanation of the methodology used in this analysis is available at the BLM Socorro Oistrict Office.

SRD categorized operators into eight size classes based on information supplied by BLM. All of SRD's data on production rates in the report was presented per AU using 1975 cost figures for each ranch size category. The report analyzed the impacts that changes in grazing use would have on income, employment, and population. It was necessary to modify SRD's report to fit the grazing use reductions for the Proposed Action or alternatives. This was accomplished by adjusting SRO's computerized ranch budgets to the actual number and size of operators in the ES Area. For example, SRO's average ranch size for the subsistence small category was 11 AUs; 13 operators were in the subsistence small category. Based on the proposed adjustments for the Proposed Action or alternatives, 8LM refigured the number of operators and the average number of AUs in each ranch size category. Therefore, for this example and based on actual data, BLM adjusted the average ranch size for the subsistence small category to 13 AUs; there were 27 operators in that category. Based upon the adjusted ranch size category, AUs, and number of operators 8LM modified the net returns per animal unit from the ranch budgets supplied by SRO. BLM then converted these modified budgets from an AU basis to a total ranch income. This equals ranch income for the ranch size category. This process was repeated for the eight different ranch categories for the Proposed Action and alternatives. BLM then calculated total income for the area, based on the Proposed Action or alternatives. The number of operators in each category was multiplied times the income per category. These were added for all eight categories. This sum equals total income in the area for the Proposed Action or alternatives.

Tables A-26 through A-37 (Appendix 6, pp. A-92-103) were derived from the ranch budgets and are the foundation for the socio-economic analysis of this ES.

TABLE A-25

GRAZING DEPENDENCY BY RANCH CATEGORY, 1975

| Ranch Category by AUs | Number of Operators | % 1/ | Total AUs 2,3/ | % | Total AUMs 2,3/ | % | Public AUMs 2/ | % | Other AUMs 2/ | % | % Oependency on Public Land |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Total ES Area (EE) | 102 | 101 | 20,090 | 100 | 241,080 | 100 | 110,685 | 100 | 130,395 | 100 | 45 |
| Subsistence Small (1-29 AUs) | 27 | 26 | 351 | 2 | 4,212 | 2 | 3,327 | 3 | 885 | 1 | 79 |
| Subsistence Large (30-69 AUs) | 22 | 22 | 1,188 | 6 | 14,256 | 6 | 9,979 | 9 | 4,277 | 3 | 70 |
| Small Commercial Small (70-110 AUs) | 7 | 7 | 609 | 3 | 7,308 | 3 | 4,677 | 4 | 2,631 | 2 | 64 |
| Small Commercial Medium (111-150 AUs) | 5 | 5 | 685 | 3 | 8,220 | 3 | 6,247 | 6 | 1,973 | 2 | 76 |
| Small Commercial Large (151-199 AUs) | 8 | 8 | 1,464 | 7 | 17,568 | 7 | 12,122 | 11 | 5,446 | 4 | 69 |
| Medium Commercial Small (200-309 AUs) | 13 | 13 | 3,393 | 17 | 40,716 | 17 | 20,765 | 19 | 19,951 | 15 | 51 |
| Medium Commercial Large (310-499 AUs) | 7 | 7 | 2,793 | 14 | 33,516 | 14 | 12,066 | 11 | 21,450 | 16 | 36 |
| Large Commercial Large (500 + AUs) | 13 | 13 | 9,607 | 48 | 115,284 | 48 | 41,502 | 37 | 73,782 | 57 | 35 |

1/ Does not add to 100 because of rounding
2/ Ooes not equal other figures in the ES because of averaging and rounding
3/ On non-AMP areas, non-public land AUMs were estimated

EE = Existing Environment

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

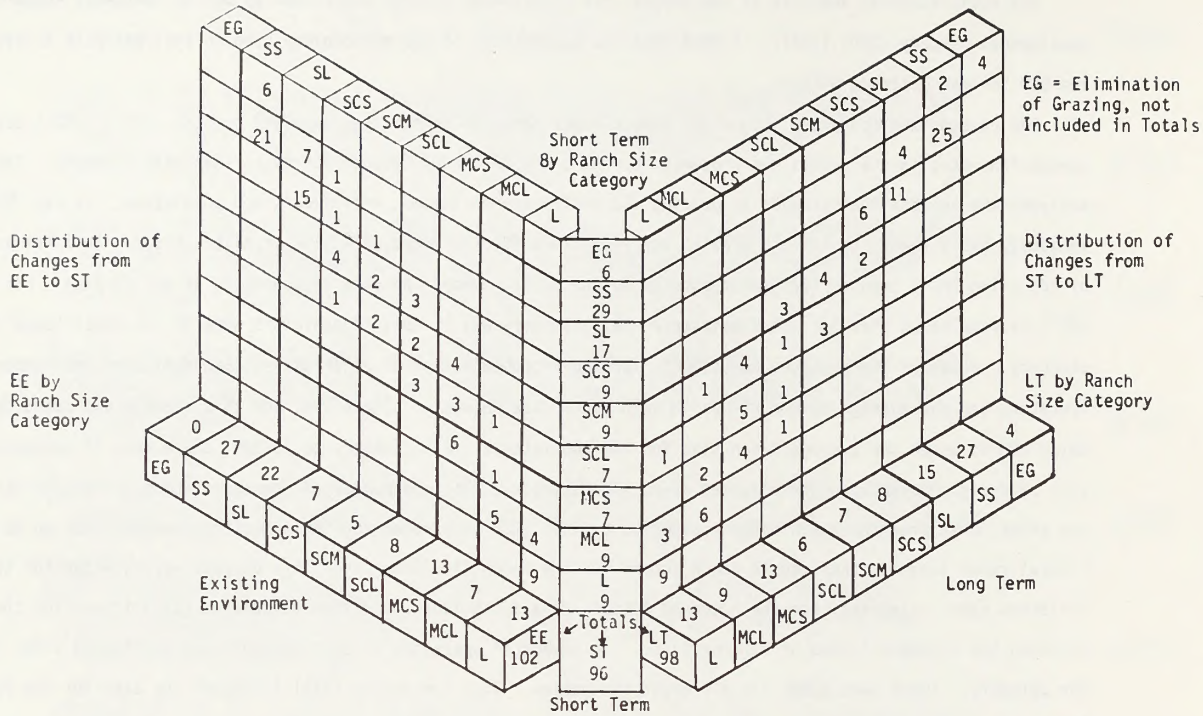



Figure A-11. Short- and long-term changes in the distribution of number of operators in ranch size categories under the Proposed Action

Source: Table 2-26

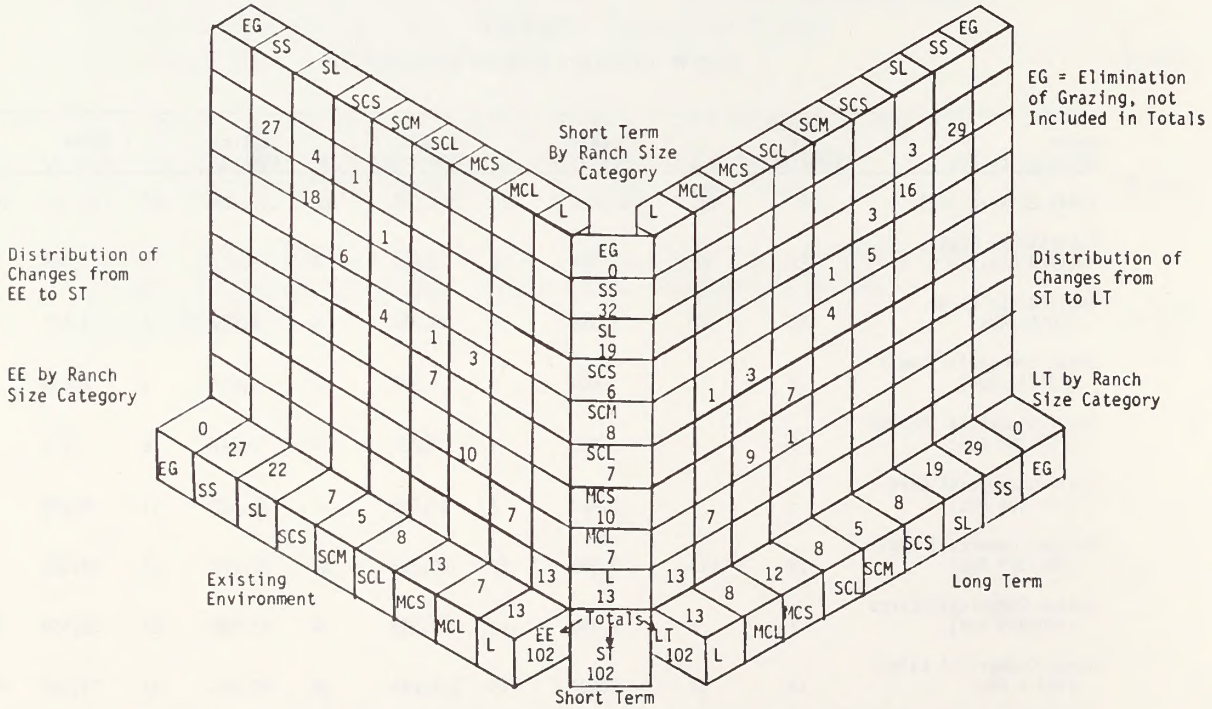



Figure A-12. Short- and long-term changes in the distribution of number of operators in ranch size categories under the No Action Alternative

Source: Table 2-26

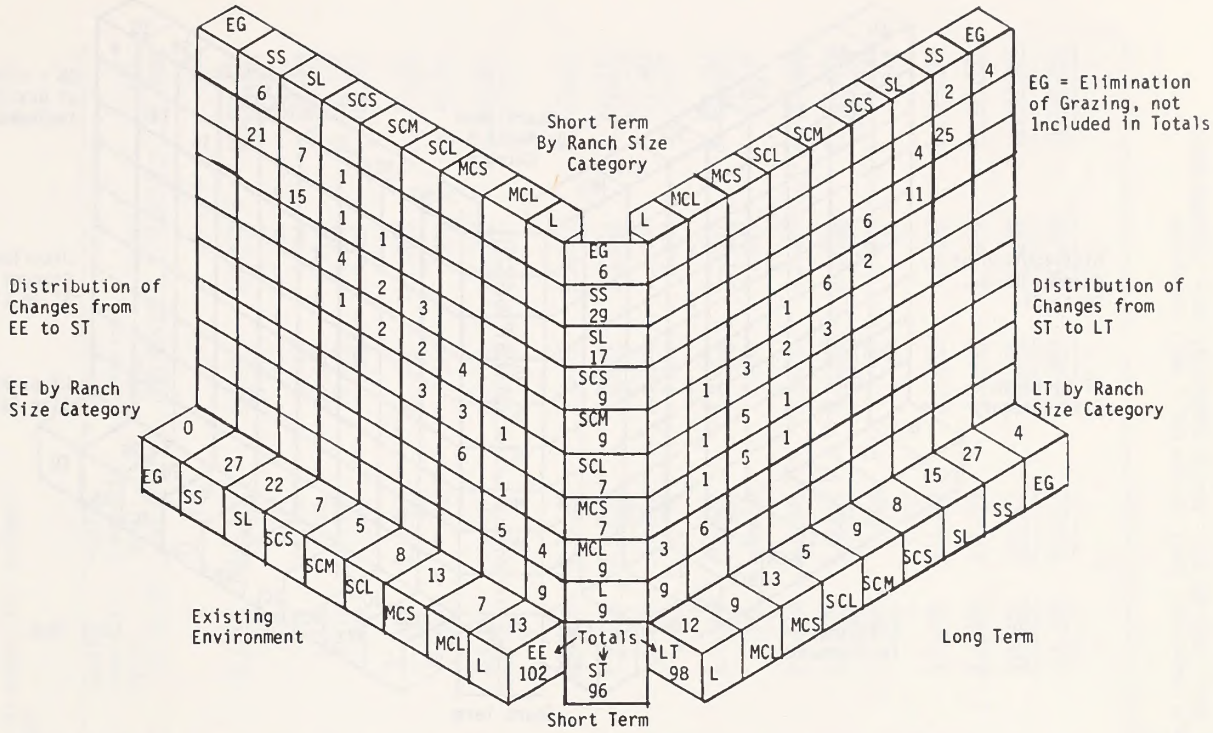



Figure A-13. Short- and long-term changes in the distribution of number of operators in ranch size categories under the Livestock Adjustment Alternative

Source: Table 2-26

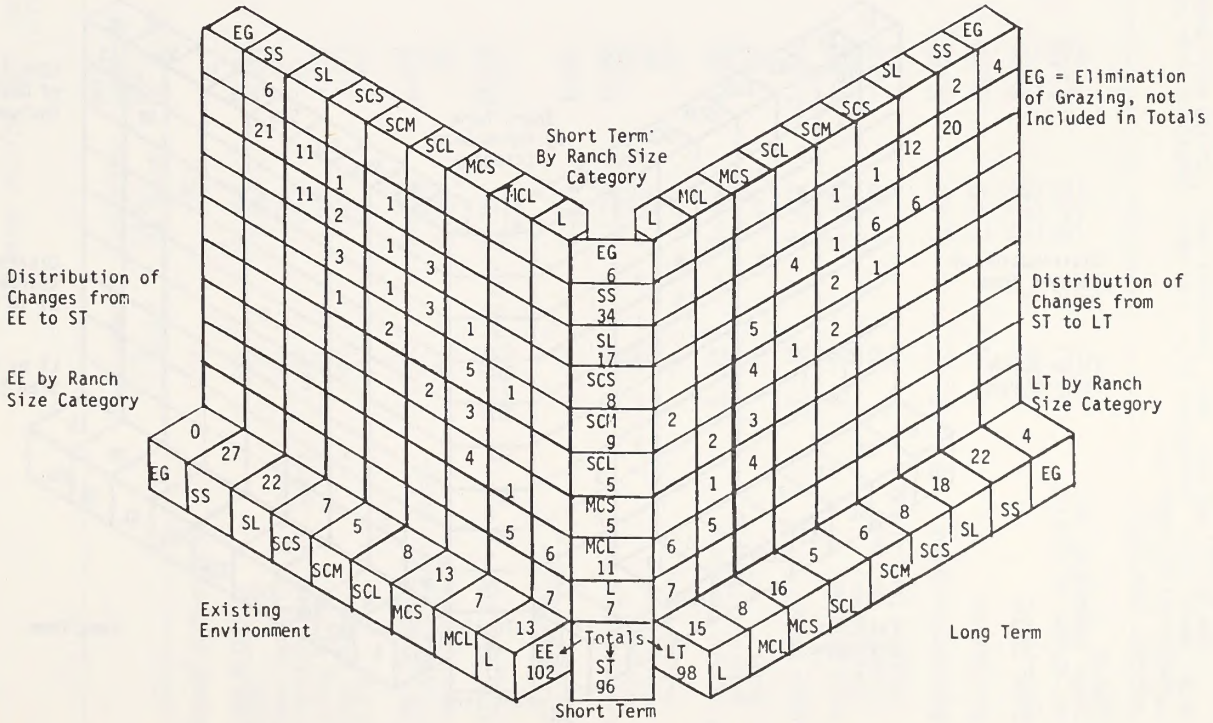



Figure A-14. Short- and long-term changes in the distribution of number of operators in ranch size categories under the Pasture Capacity Level Alternative

Source: Table 2-26

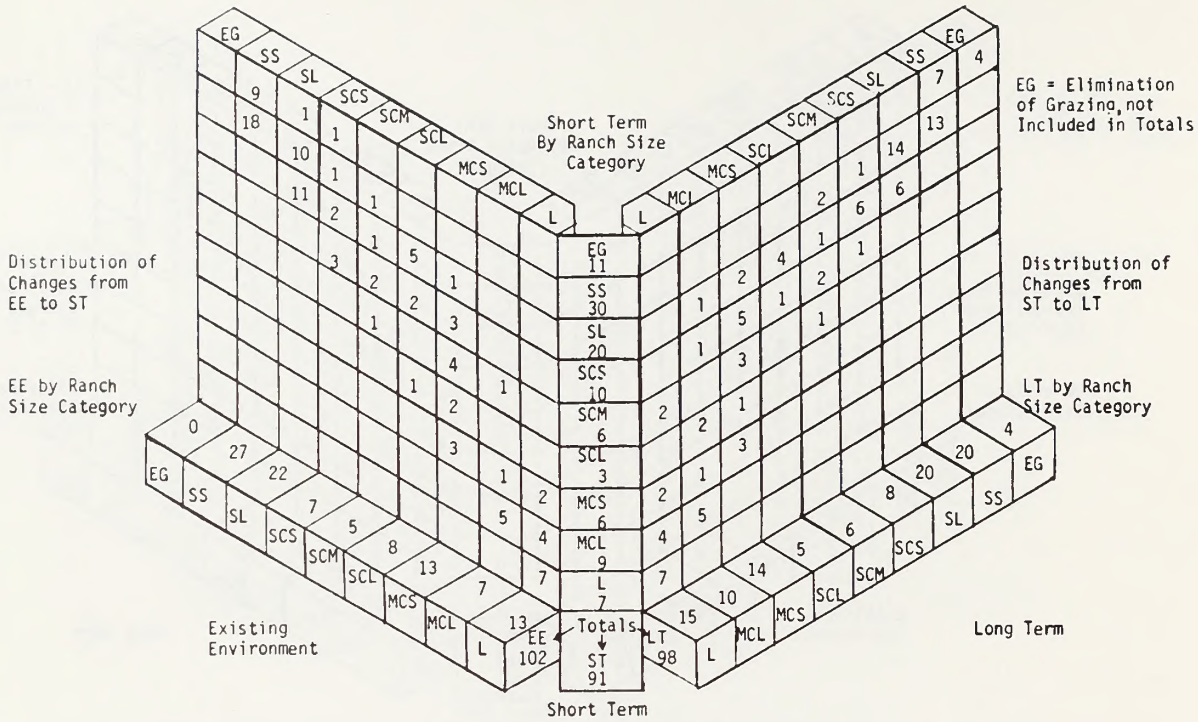



Figure A-15. Short- and long-term changes in the distribution of number of operators in ranch size categories under the Enhancement of Sensitive Resource Values Alternative

Source: Table 2-26

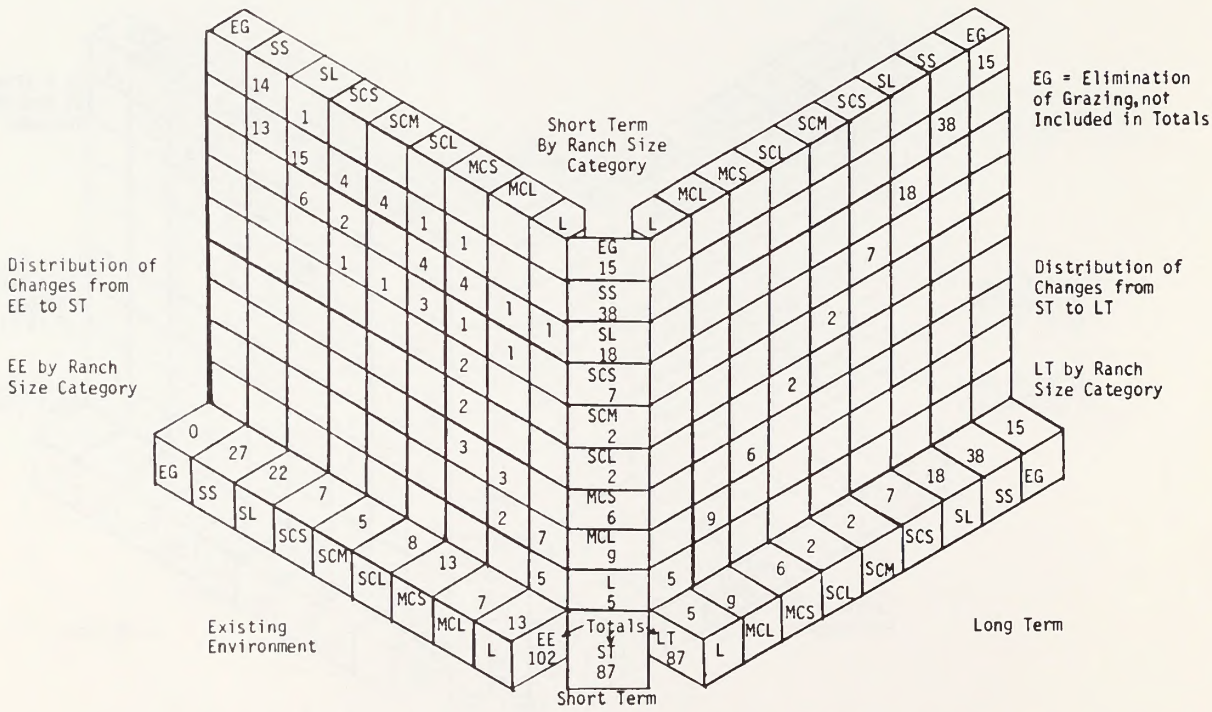



Figure A-16. Short- and long-term changes in the distribution of number of operators in ranch size categories under the No Grazing Alternative

Source: Table 2-26

TABLE A-26

ESTIMATEO RECEIPTS, COSTS, ANO NET RETURNS PER RANCH SIZE CATEGORY
FOR EXISTING ENVIRONMENT

| | Subsistence Small (13 AUs)** | Subsistence Large (54 AUs)** | Small Commercial Small (87 AUs)** | Small Commercial Medium (137 AUs)** | Small Commercial Large (183 AUs)** | Medium Commercial Small (261 AUs)** | Medium Commercial Large (399 AUs)** | Large (739 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 27 | 22 | 7 | 5 | 8 | 13 | 7 | 13 | 102 |
| CASH RECEIPTS* | $ 489 | $4,650 | $9,283 | $15,650 | $21,001 | $33,176 | $52,357 | $98,656 | $2,507,057 |
| Cows | 234 | 1,686 | 2,074 | 2,615 | 3,838 | 8,375 | 11,455 | 18,726 | 534,205 |
| Yearlings Heifer (1-2 years) | -0- | -0- | 817 | -0- | 754 | 1,107 | 938 | 916 | 44,616 |
| Yearlings Steer (1-2 years) | -0- | -0- | -0- | -0- | 430 | 1,806 | 2,342 | 2,904 | 81,064 |
| Heifer Calves | 115 | 1,079 | 1,776 | 4,736 | 5,479 | 7,026 | 13,031 | 27,432 | 645,958 |
| Steer Calves | 140 | 1,885 | 4,174 | 7,472 | 9,711 | 13,400 | 22,528 | 44,214 | 1,096,194 |
| Bulls | -0- | -0- | 442 | 827 | 789 | 1,462 | 2,063 | 4,464 | 105,020 |
| NON-CASH RECEIPTS* | $ 289 | $ 397 | $ 242 | $ 381 | $ 365 | $ 441 | $ 814 | $ 872 | $ 45,823 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Oomestic Consumption | 289 | 397 | 242 | 381 | 365 | 441 | 814 | 872 | 45,823 |
| TOTAL RECEIPTS* | $ 778 | $5,047 | $9,525 | $16,031 | $21,366 | $33,617 | $53,171 | $99,528 | $2,552,880 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 68 | $ 416 | $1,088 | $ 1,982 | $ 2,871 | $ 3,132 | $ 4,553 | $ 8,011 | $ 228,212 |
| Leases/Grazing Fees: | $ 130 | $ 756 | $1,488 | $ 2,615 | $ 3,128 | $ 4,098 | $ 5,881 | $ 9,829 | $ 290,875 |
| BLM (AUM) | 85 | 461 | 744 | 1,302 | 1,565 | 1,780 | 2,322 | 3,865 | 126,314 |
| State (Acres) | 45 | 295 | 522 | 962 | 1,096 | 1,561 | 2,398 | 3,806 | 111,494 |
| Private (Acres) | -0- | -0- | 222 | 351 | 467 | 757 | 1,161 | 2,158 | 53,067 |
| Livestock Expenses: | $ 25 | $ 103 | $ 686 | $ 1,370 | $ 1,546 | $ 2,239 | $ 3,372 | $ 7,124 | $ 172,284 |
| Veterinary/Medicine | 25 | 103 | 174 | 274 | 366 | 574 | 878 | 1,848 | 46,089 |
| Bulls | -0- | -0- | 512 | 1,096 | 1,180 | 1,665 | 2,494 | 5,276 | 126,195 |
| Labor (Hired) | $ 18 | $ 211 | $ 413 | $ 988 | $ 1,510 | $ 2,589 | $ 4,309 | $ 7,560 | $ 187,139 |
| Other Expenses: | $ 80 | $ 404 | $ 991 | $ 1,887 | $ 2,745 | $ 2,855 | $ 4,088 | $ 6,608 | $ 201,015 |
| Miscellaneous | 66 | 337 | 829 | 1,637 | 2,408 | 2,349 | 3,220 | 5,203 | 163,164 |
| Property Tax (land) | 13 | 60 | 150 | 225 | 306 | 454 | 780 | 1,279 | 34,283 |
| Property Tax (cattle) | 1 | 7 | 12 | 25 | 31 | 52 | 88 | 126 | 3,568 |
| Machinery/Equipment | $ 391 | $1,504 | $2,305 | $ 3,092 | $ 3,762 | $ 3,195 | $ 4,381 | $ 6,843 | $ 266,497 |
| Oevelopments | $ 65 | $ 322 | $1,835 | $ 870 | $ 1,045 | $ 1,195 | $ 1,708 | $ 5,853 | $ 137,974 |
| TOTAL COSTS* | $ 777 | $3,716 | $8,806 | $12,804 | $16,607 | $19,303 | $28,292 | $51,828 | $1,483,996 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT, ANO CAPITAL | $ 1 | $1,331 | $ 719 | $ 3,227 | $ 4,759 | $14,314 | $24,879 | $47,700 | $1,068,884 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: 8LM Socorro Oistrict Grazing Files and Southwest Research and Oevelopment Co., 1977

TABLE A-27

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR PROPOSED ACTION AND LIVESTOCK ADJUSTMENT ALTERNATIVE IN THE SHORT TERM

| | Subsistence Small (13 AUs)** | Subsistence Large (46 AUs)** | Small Commercial Small (85 AUs)** | Small Commercial Medium (137 AUs)** | Small Commercial Large (172 AUs)** | Medium Commercial Small (253 AUs)** | Medium Commercial Large (412 AUs)** | Large (663 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 29 | 17 | 9 | 9 | 7 | 7 | 9 | 9 | 96 |
| Livestock Adjustments From Existing Environment | +10% | -30% | +30% | +80% | -20% | -50% | +30% | -40% | |
| CASH RECEIPTS* | $651 | $3,106 | $11,974 | $16,080 | $20,690 | $31,528 | $54,895 | $88,421 | $1,979,537 |
| Cows | 234 | 1,203 | 5,223 | 2,652 | 3,844 | 8,476 | 12,063 | 16,423 | 440,726 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 593 | -0- | 776 | 390 | 968 | 872 | 30,059 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 686 | 1,402 | 1,838 | 2,281 | 51,687 |
| Heifer Calves | 134 | 598 | 1,727 | 4,736 | 5,220 | 6,775 | 13,456 | 24,895 | 501,343 |
| Steer Calves | 283 | 1,305 | 4,028 | 7,806 | 8,903 | 12,739 | 23,904 | 39,090 | 855,338 |
| Bulls | -0- | -0- | 403 | 886 | 1,261 | 1,746 | 2,666 | 4,860 | 100,384 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $134 | $ 367 | $ 359 | $ 364 | $ 392 | $ 531 | $ 782 | $ 948 | $ 38,663 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 134 | 367 | 359 | 364 | 392 | 531 | 782 | 948 | 38,663 |
| TOTAL RECEIPTS* | $785 | $3,473 | $12,333 | $16,444 | $21,082 | $32,059 | $55,677 | $89,369 | $2,018,200 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 68 | $ 354 | $ 1,063 | $ 1,982 | $ 2,699 | $ 3,036 | $ 4,701 | $ 7,187 | $ 182,532 |
| Lease/Grazing Fees: | $123 | $ 816 | $ 1,756 | $ 2,031 | $ 3,306 | $ 6,201 | $ 5,224 | $12,325 | $ 276,012 |
| BLM (AUMs) | 85 | 393 | 727 | 1,302 | 1,471 | 1,725 | 2,398 | 3,467 | 102,564 |
| State (Acres) | 38 | 423 | 722 | 534 | 1,288 | 3,016 | 1,903 | 5,689 | 118,053 |
| Private (Acres) | -0- | -0- | 307 | 195 | 547 | 1,460 | 923 | 3,169 | 55,395 |
| Livestock Expenses: | $ 25 | $ 87 | $ 878 | $ 1,188 | $ 1,732 | $ 2,702 | $ 3,877 | $ 6,922 | $ 149,027 |
| Veterinary/Medicine | 25 | 87 | 170 | 274 | 344 | 557 | 906 | 1,658 | 35,583 |
| Bulls | -0- | -0- | 708 | 914 | 1,388 | 2,145 | 2,971 | 5,264 | 113,444 |
| Labor (Hired) | $ 18 | $ 179 | $ 412 | $ 988 | $ 1,419 | $ 2,510 | $ 4,450 | $ 6,782 | $ 144,756 |
| Other Expenses: | $ 78 | $ 379 | $ 942 | $ 1,787 | $ 2,653 | $ 3,206 | $ 4,034 | $ 6,703 | $ 170,912 |
| Miscellaneous | 66 | 287 | 725 | 1,637 | 2,264 | 2,277 | 3,325 | 4,668 | 131,775 |
| Property Tax (Land) | 11 | 86 | 207 | 125 | 358 | 878 | 618 | 1,909 | 36,164 |
| Property Tax (Cattle) | 1 | 6 | 10 | 25 | 31 | 51 | 91 | 126 | 2,973 |
| Machinery/Equipment | $375 | $1,509 | $ 2,496 | $ 2,735 | $ 3,767 | $ 3,891 | $ 4,252 | $ 7,207 | $ 240,344 |
| Developments | $ 55 | $ 462 | $ 2,540 | $ 484 | $ 1,226 | $ 2,307 | $ 1,355 | $ 8,752 | $ 152,359 |
| TOTAL COST* | $742 | $3,786 | $10,087 | $11,195 | $16,802 | $23,853 | $27,893 | $55,878 | $1,315,942 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT, AND CAPITAL | $ 43 | -$ 313 | $ 2,246 | $ 5,249 | $ 4,280 | $ 8,206 | $27,784 | $33,442 | $ 702,258 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size

Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-28

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR NO ACTION ALTERNATIVE IN THE SHORT TERM

| | Subsistence Small (13 AUs)** | Subsistence Large (51 AUs)** | Small Commercial Small (87 AUs)** | Small Commercial Medium (143 AUs)** | Small Commercial Large (181 AUs)** | Medium Commercial Small (254 AUs)** | Medium Commercial Large (414 AUs)** | Large (727 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 32 | 19 | 6 | 8 | 7 | 10 | 7 | 13 | 102 |
| Livestock Adjustments From Existing Environment | +20% | -20% | -10% | +70% | -10% | -30% | 0% | 0% | |
| CASH RECEIPTS* | $ 752 | $ 4,018 | $ 8,893 | $17,225 | $21,445 | $31,586 | $54,263 | $ 97,076 | $2,399,368 |
| Cows | 236 | 1,692 | 2,005 | 2,881 | 3,844 | 8,151 | 11,770 | 18,517 | 506,307 |
| Yearlings Heifer (1-2 Years) | -0- | -0- | 590 | -0- | 959 | 930 | 973 | 952 | 38,740 |
| Yearlings Steer (1-2 Years) | -0- | 872 | -0- | -0- | 679 | 1,819 | 2,331 | 2,835 | 92,683 |
| Heifer Calves | 233 | 1,454 | 1,854 | 4,866 | 5,345 | 6,734 | 13,459 | 27,001 | 635,115 |
| Steer Calves | 283 | -0- | 4,032 | 8,668 | 9,369 | 12,748 | 23,590 | 43,700 | 1,028,885 |
| Bulls | -0- | -0- | 412 | 810 | 1,249 | 1,204 | 2,140 | 4,071 | 97,638 |
| NON-CASH RECEIPTS* | $ 141 | $ 270 | $ 271 | $ 350 | $ 360 | $ 470 | $ 675 | $ 858 | $ 37,167 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 141 | 270 | 271 | 350 | 360 | 470 | 675 | 858 | 37,167 |
| TOTAL RECEIPTS* | $ 893 | $ 4,288 | $ 9,164 | $17,575 | $21,805 | $32,056 | $54,938 | $ 97,934 | $2,436,535 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 68 | $ 393 | $ 1,088 | $ 2,069 | $ 2,840 | $ 3,048 | $ 4,724 | $ 7,881 | $ 218,604 |
| Leases/Grazing Fees: | $ 123 | $ 780 | $ 1,564 | $ 2,163 | $ 3,258 | $ 4,945 | $ 6,102 | $ 9,669 | $ 286,111 |
| BLM (AUMs) | 85 | 436 | 744 | 1,359 | 1,548 | 1,732 | 2,409 | 3,802 | 120,785 |
| State (Acres) | 38 | 344 | 576 | 589 | 1,200 | 2,164 | 2,488 | 3,744 | 112,048 |
| Private (Acres) | -0- | -0- | 244 | 215 | 510 | 1,049 | 1,205 | 2,123 | 53,278 |
| Livestock Expenses: | $ 25 | $ 97 | $ 739 | $ 1,293 | $ 1,654 | $ 2,098 | $ 3,499 | $ 7,009 | $ 165,589 |
| Veterinary/Medicine | 25 | -0- | 174 | 286 | 366 | 559 | 911 | 1,818 | 42,267 |
| Bulls | -0- | 97 | 565 | 1,007 | 1,292 | 1,539 | 2,588 | 5,191 | 123,322 |
| Labor (Hired) | $ 18 | $ 199 | $ 413 | $ 1,031 | $ 1,493 | $ 2,520 | $ 4,471 | $ 7,437 | $ 178,712 |
| Other Expenses: | $ 78 | $ 394 | $ 1,006 | $ 1,872 | $ 2,750 | $ 2,967 | $ 4,239 | $ 6,514 | $ 194,269 |
| Miscellaneous | 66 | 318 | 829 | 1,709 | 2,382 | 2,286 | 3,341 | 5,118 | 156,255 |
| Property Tax (land) | 11 | 70 | 165 | 137 | 335 | 630 | 807 | 1,258 | 34,416 |
| Property Tax (cattle) | 1 | 6 | 12 | 26 | 33 | 51 | 91 | 138 | 3,598 |
| Machinery/Equipment | $ 375 | $ 1,507 | $ 2,367 | $ 2,880 | $ 3,825 | $ 3,449 | $ 4,546 | $ 6,732 | $ 258,478 |
| Improvements | $ 55 | $ 376 | $ 2,026 | $ 533 | $ 1,144 | $ 1,659 | $ 1,772 | $ 5,758 | $ 137,180 |
| TOTAL COSTS* | $ 742 | $ 3,746 | $ 9,203 | $11,841 | $16,964 | $20,686 | $29,353 | $ 51,000 | $1,438,943 |
| NET RETURNED TO OPERATOR LABOR, MANAGEMENT AND CAPITAL | $ 151 | $ 542 | -$ 39 | $ 5,734 | $ 4,841 | $11,370 | $25,585 | $ 46,934 | $ 997,592 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-29

.ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR PASTURE CAPACITY LEVEL ALTERNATIVE IN THE SHORT TERM

| | Subsistence Small (12 AUs)** | Subsistence Large (47 AUs)** | Small Commercial Small (91 AUs)** | Small Commercial Medium (125 AUs)** | Small Commercial Large (177 AUs)** | Medium Commercial Small (250 AUs)** | Medium Commercial Large (392 AUs)** | Large (630 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 34 | 17 | 8 | 9 | 5 | 5 | 11 | 7 | 96 |
| Livestock Adjustments For Existing Environment | +20% | +30% | +20% | +60% | -40% | -60% | +50% | -50% | |
| CASH RECEIPTS* | $ 753 | $3,187 | $9,476 | $14,157 | $19,787 | $30,462 | $52,534 | $82,480 | $1,689,481 |
| Cows | 236 | 1,297 | 2,260 | 2,386 | 3,565 | 8,163 | 11,478 | 15,202 | 360,839 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 781 | -0- | 798 | 965 | 768 | 1,235 | 32,156 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 956 | 1,155 | 1,654 | 1,966 | 42,511 |
| Heifer Calves | 234 | 646 | 1,725 | 4,339 | 5,227 | 6,628 | 12,875 | 23,108 | 434,445 |
| Steer Calves | 283 | 1,244 | 4,325 | 7,001 | 8,402 | 12,258 | 23,222 | 36,660 | 743,741 |
| Bulls | -0- | -0- | 385 | 431 | 839 | 1,293 | 2,537 | 4,309 | 75,689 |
| NON-CASH RECEIPTS* | $ 141 | $ 411 | $ 455 | $ 398 | $ 425 | $ 563 | $ 800 | $ 1,008 | $ 39,799 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 141 | 411 | 455 | 398 | 425 | 563 | 800 | 1,008 | 39,799 |
| TOTAL RECEIPTS* | $ 894 | $3,598 | $9,931 | $14,555 | $20,212 | $31,025 | $53,334 | $83,488 | $1,729,280 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 63 | $ 362 | $1,138 | $ 1,809 | $ 2,777 | $ 3,000 | $ 4,483 | $ 6,829 | $ 159,682 |
| Lease/Grazing Fees: | $ 113 | $ 767 | $1,425 | $ 1,933 | $ 4,029 | $ 7,255 | $ 4,557 | $13,463 | $ 246,466 |
| BLM (AUMs) | 78 | 402 | 778 | 1,188 | 1,513 | 1,705 | 2,221 | 3,295 | 89,988 |
| State (Acres) | 35 | 365 | 454 | 546 | 1,766 | 3,740 | 1,572 | 6,489 | 106,186 |
| Private (Acres) | -0- | -0- | 193 | 199 | 750 | 1,810 | 764 | 3,679 | 50,292 |
| Livestock Expenses: | $ 23 | $ 90 | $ 628 | $ 873 | $ 1,306 | $ 1,880 | $ 3,721 | $ 6,577 | $ 118,093 |
| Veterinary/Medicine | 23 | 90 | 182 | 250 | 354 | 550 | 863 | 1,575 | 31,056 |
| Bulls | -0- | -0- | 446 | 623 | 952 | 1,330 | 2,858 | 5,002 | 87,037 |
| Labor (Hired) | $ 17 | $ 184 | $ 432 | $ 901 | $ 1,460 | $ 2,480 | $ 4,233 | $ 6,445 | $ 126,649 |
| Other Expenses: | $ 72 | $ 374 | $1,010 | $ 1,645 | $ 2,853 | $ 3,390 | $ 3,760 | $ 6,735 | $ 151,411 |
| Miscellaneous | 61 | 294 | 867 | 1,494 | 2,329 | 2,250 | 3,164 | 4,435 | 116,198 |
| Property Tax (land) | 10 | 75 | 130 | 128 | 492 | 1,090 | 510 | 2,180 | 32,587 |
| Property Tax (cattle) | 1 | 5 | 13 | 23 | 32 | 50 | 86 | 120 | 2,626 |
| Machinery/Equipment | $ 346 | $1,453 | $2,307 | $ 2,544 | $ 4,269 | $ 4,248 | $ 3,932 | $ 7,352 | $ 215,118 |
| Developments | $ 51 | $ 400 | $1,600 | $ 494 | $ 1,685 | $ 2,863 | $ 1,117 | $ 9,979 | $ 130,660 |
| TOTAL COST* | $ 685 | $3,630 | $8,540 | $10,199 | $18,379 | $25,116 | $25,803 | $57,380 | $1,148,079 |
| NET RETURNS TO OPERATOR, LABOR, MANAGEMENT, AND CAPITAL | $ 209 | -$ 32 | $1,391 | $ 4,356 | $ 1,833 | $ 5,909 | $27,531 | $26,108 | $ 581,201 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-30

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR THE ENHANCEMENT OF SENSITIVE RESOURCE VALUES ALTERNATIVE IN THE SHORT TERM

| | Subsistence Small (10 AUs)** | Subsistence Large (44 AUs)** | Small Commercial Small (87 AUs)** | Small Commercial Medium (125 AUs)** | Small Commercial Large (180 AUs)** | Medium Commercial Small (265 AUs)** | Medium Commercial Large (383 AUs)** | Large (614 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 30 | 20 | 10 | 6 | 3 | 6 | 9 | 7 | 91 |
| Livestock Adjustments From Existing Environment | -10% | -30% | +40% | +10% | -60% | -50% | +30% | -60% | |
| CASH RECEIPTS* | $ 378 | $2,983 | $9,092 | $14,589 | $20,819 | $33,764 | $51,994 | $80,955 | $1,549,126 |
| Cows | 237 | 1,214 | 2,005 | 2,386 | 4,138 | 9,007 | 11,258 | 15,761 | 343,861 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 780 | -0- | 1,177 | 387 | 980 | 411 | 25,350 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 1,408 | 1,617 | 1,642 | 1,719 | 40,737 |
| Heifer Calves | 117 | 604 | 1,721 | 4,339 | 5,220 | 7,179 | 12,771 | 22,964 | 389,745 |
| Steer Calves | 141 | 1,165 | 4,174 | 7,001 | 7,582 | 13,417 | 22,756 | 35,790 | 669,858 |
| Bulls | -0- | -0- | 412 | 863 | 1,294 | 2,157 | 2,587 | 4,310 | 79,575 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $ 141 | $ 385 | $ 367 | $ 398 | $ 412 | $ 562 | $ 819 | $ 1,013 | $ 37,058 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 141 | 385 | 367 | 398 | 412 | 562 | 819 | 1,013 | 37,058 |
| TOTAL RECEIPTS* | $ 519 | $3,368 | $9,459 | $14,987 | $21,231 | $34,326 | $52,813 | $81,968 | $1,586,184 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 53 | $ 339 | $1,088 | $1,809 | $ 2,824 | $ 3,180 | $ 4,473 | $ 6,656 | $ 144,505 |
| Leases/Grazing Fees: | $ 103 | $ 718 | $1,274 | $2,273 | $ 5,379 | $ 6,495 | $ 4,970 | $15,601 | $ 252,872 |
| BLM (AUMs) | 65 | 376 | 744 | 1,188 | 1,539 | 1,807 | 2,281 | 3,211 | 82,503 |
| State (Acres) | 38 | 342 | 372 | 795 | 2,695 | 3,159 | 1,811 | 7,908 | 115,164 |
| Private (Acres) | -0- | -0- | 158 | 290 | 1,145 | 1,529 | 878 | 4,482 | 55,205 |
| Livestock Expenses: | $ 19 | $ 84 | $ 539 | $1,156 | $ 1,813 | $ 2,830 | $ 3,688 | $ 6,410 | $ 115,057 |
| Veterinary/Medicine | 19 | 84 | 174 | 250 | 360 | 583 | 862 | 1,535 | 28,571 |
| Bulls | -0- | -0- | 365 | 906 | 1,453 | 2,247 | 2,826 | 4,875 | 86,486 |
| Labor (Hired) | $ 14 | $ 172 | $ 413 | $ 901 | $ 1,485 | $ 2,629 | $ 4,234 | $ 6,281 | $ 115,698 |
| Other Expenses: | $ 62 | $ 350 | $ 948 | $1,702 | $ 3,152 | $ 3,358 | $ 3,837 | $ 7,099 | $ 140,522 |
| Miscellaneous | 51 | 275 | 829 | 1,494 | 2,369 | 2,385 | 3,163 | 4,323 | 102,899 |
| Property Tax (Land) | 10 | 70 | 107 | 185 | 751 | 920 | 588 | 2,569 | 35,258 |
| Property Tax (Cattle) | 1 | 5 | 12 | 23 | 32 | 53 | 86 | 117 | 2,365 |
| Machinery/Equipment | $ 301 | $1,360 | $2,134 | $2,753 | $ 5,143 | $ 4,076 | $ 4,045 | $ 7,908 | $ 196,704 |
| Developments | $ 50 | $ 374 | $1,311 | $ 719 | $ 2,569 | $ 2,417 | $ 1,290 | $12,157 | $ 143,822 |
| TOTAL COSTS* | $ 189 | $3,397 | $7,707 | $11,313 | $22,365 | $24,985 | $26,537 | $62,112 | $1,109,180 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT, AND CAPITAL | $ 330 | -$ 29 | $1,752 | $ 3,674 | -$ 1,134 | $ 9,341 | $26,276 | $19,856 | $ 477,004 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-31

ESTIMATEO RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR NO GRAZING ALTERNATIVE IN THE SHORT TERM

| | Subsistence Small (10 AUs)** | Subsistence Large (46 AUs)** | Small Commercial Small (89 AUs)** | Small Commercial Medium (129 AUs)** | Small Commercial Large (193 AUs)** | Medium Commercial Small (249 AUs)** | Medium Commercial Large (415 AUs)** | Large (671 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 38 | 18 | 7 | 2 | 2 | 6 | 9 | 5 | 87 |
| Livestock Adjustments From Existing Environment | +10% | -30% | 0 | -60% | -70% | -60% | +30% | -70% | |
| CASH RECEIPTS* | $ 637 | $3,128 | $9,241 | $14,534 | $21,852 | $30,374 | $55,212 | $87,083 | $1,332,536 |
| Cows | 237 | 1,213 | 2,007 | 2,121 | 4,420 | 8,163 | 12,077 | 16,809 | 299,687 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 781 | 592 | 795 | 965 | 979 | 832 | 27,002 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 1,857 | 1,150 | 1,872 | 1,651 | 35,717 |
| Heifer Calves | 117 | 604 | 1,853 | 4,198 | 5,620 | 6,601 | 13,612 | 25,102 | 335,549 |
| Steer Calves | 283 | 1,311 | 4,178 | 6,343 | 7,413 | 12,208 | 24,091 | 38,059 | 571,472 |
| Bulls | -0- | -0- | 422 | 1,280 | 1,747 | 1,287 | 2,581 | 4,630 | 63,109 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $ 141 | $ 385 | $ 376 | $ 410 | $ 384 | $ 561 | $ 813 | $ 560 | $ 29,991 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 141 | 385 | 376 | 410 | 384 | 561 | 813 | 560 | 29,991 |
| TOTAL RECEIPTS* | $ 778 | $3,513 | $9,617 | $14,944 | $22,236 | $30,935 | $56,025 | $87,643 | $1,362,527 |
| COST of OPERATION* | | | | | | | | | |
| Feed | $ 53 | $ 354 | $1,113 | $1,867 | $ 3,028 | $ 2,988 | $ 4,735 | $ 7,274 | $ 122,880 |
| Lease/Grazing Fees: | $ 97 | $ 751 | $1,521 | $4,317 | $ 7,081 | $ 7,226 | $ 5,262 | $21,559 | $ 249,156 |
| BLM (AUMs) | 65 | 393 | 761 | 1,226 | 1,650 | 1,698 | 2,415 | 3,509 | 70,091 |
| State (Acres) | 32 | 358 | 533 | 2,265 | 3,812 | 3,725 | 1,917 | 11,521 | 120,753 |
| Private (Acres) | -0- | -0- | 227 | 826 | 1,619 | 1,803 | 930 | 6,529 | 58,312 |
| Livestock Expenses: | $ 19 | $ 87 | $ 701 | $1,548 | $ 2,440 | $ 1,873 | $ 3,905 | $ 7,006 | $ 96,584 |
| Veterinary/Medicine | 19 | 87 | 178 | 258 | 386 | 548 | 913 | 1,678 | 24,717 |
| Bulls | -0- | -0- | 523 | 1,290 | 2,054 | 1,325 | 2,992 | 5,328 | 71,867 |
| Labor (Hired) | $ 14 | $ 179 | $ 423 | $ 930 | $ 1,592 | $ 2,470 | $ 4,482 | $ 6,864 | $ 101,237 |
| Other Expenses: | $ 61 | $ 366 | $1,013 | $2,093 | $ 3,637 | $ 3,377 | $ 4,038 | $ 8,723 | $ 127,676 |
| Miscellaneous | 51 | 287 | 848 | 1,542 | 2,540 | 2,241 | 3,349 | 4,724 | 88,411 |
| Property Tax (Land) | 9 | 73 | 153 | 528 | 1,062 | 1,086 | 598 | 3,872 | 37,165 |
| Property Tax (Cattle) | 1 | 6 | 12 | 23 | 35 | 50 | 91 | 127 | 2,100 |
| Machinery/Equipment | $ 294 | $1,422 | $2,358 | $4,049 | $ 6,336 | $ 4,231 | $ 4,250 | $ 9,984 | $ 187,600 |
| Oevelopments | $ 46 | $ 391 | $1,877 | $2,049 | $ 3,634 | $ 2,852 | $ 1,316 | $17,714 | $ 150,817 |
| TOTAL COST* | $ 584 | $3,550 | $9,006 | $16,853 | $27,748 | $25,017 | $27,988 | $79,124 | $1,035,950 |
| NET RETURNS TO OPERATOR LA8OR, MANAGEMENT ANO CAPITAL | $ 194 | -$ 37 | $ 611 | -$1,909 | -$5,512 | $ 5,918 | $28,037 | $ 8,519 | $ 326,577 |

*Oenotes 1975 Oollars
**Oenotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro Oistrict Grazing Files and Southwest Research and Oevelopment Co., 1977

TABLE A-32

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR PROPOSED ACTION IN THE LONG TERM

| | Subsistence Small (15 AUs)** | Subsistence Large (51 AUs)** | Small Commercial Small (86 AUs)** | Small Commercial Medium (126 AUs)** | Small Commercial Large (173 AUs)** | Medium Commercial Small (254 AUs)** | Medium Commercial Large (412 AUs)** | Large (745 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 27 | 15 | 8 | 7 | 6 | 13 | 9 | 13 | 98 |
| Livestock Adjustments From Existing Environment | +20% | -40% | 0% | +30% | -30% | 0% | +30% | 0% | |
| CASH RECEIPTS* | $749 | $5,400 | $9,241 | $12,932 | $11,446 | $32,916 | $55,228 | $ 99,502 | $2,552,837 |
| Cows | 234 | 2,827 | 2,007 | 2,373 | 2,005 | 8,310 | 12,063 | 18,662 | 552,623 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 781 | -0- | 543 | 1,098 | 968 | 976 | 45,180 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 406 | 1,792 | 1,838 | 2,906 | 80,052 |
| Heifer Calves | 233 | 890 | 1,853 | 4,322 | 2,900 | 6,970 | 13,753 | 27,669 | 656,203 |
| Steer Calves | 282 | 1,683 | 4,178 | 5,422 | 4,847 | 13,295 | 24,118 | 44,700 | 1,104,316 |
| Bulls | -0- | -0- | 442 | 815 | 745 | 1,451 | 2,488 | 4,589 | 114,463 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $140 | $ 388 | $ 376 | $ 350 | $ 344 | $ 438 | $ 672 | $ 879 | $ 40,291 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 140 | 388 | 376 | 350 | 344 | 438 | 672 | 879 | 40,291 |
| TOTAL RECEIPTS* | $889 | $5,788 | $9,617 | $13,282 | $11,790 | $33,354 | $55,900 | $100,381 | $2,983,128 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 79 | $ 393 | $1,113 | $ 1,823 | $ 2,715 | $ 3,108 | $ 4,701 | $ 8,076 | $ 233,684 |
| Lease/Grazing Fees: | $142 | $ 905 | $1,521 | $ 2,123 | $ 3,579 | $ 4,066 | $ 5,224 | $ 9,908 | $ 294,590 |
| BLM (AUMs) | 98 | 436 | 761 | 1,197 | 1,480 | 1,766 | 2,398 | 3,896 | 127,721 |
| State (Acres) | 44 | 469 | 533 | 679 | 1,472 | 1,549 | 1,903 | 3,837 | 113,317 |
| Private (Acres) | -0- | -0- | 227 | 247 | 627 | 751 | 923 | 2,175 | 53,652 |
| Livestock Expenses: | $ 29 | $ 97 | $ 701 | $ 1,026 | $ 1,932 | $ 2,222 | $ 3,877 | $ 7,182 | $ 182,988 |
| Veterinary/Medicine | 29 | 97 | 178 | 252 | 346 | 510 | 906 | 1,863 | 46,505 |
| Bulls | -0- | -0- | 523 | 774 | 1,586 | 1,652 | 2,971 | 5,319 | 136,480 |
| Labor (Hired) | $ 21 | $ 199 | $ 423 | $ 908 | $ 1,427 | $ 2,569 | $ 4,450 | $ 7,621 | $ 194,374 |
| Other Expenses: | $ 91 | $ 421 | $1,013 | $ 1,687 | $ 2,718 | $ 2,834 | $ 4,034 | $ 6,676 | $ 204,942 |
| Miscellaneous | 76 | 319 | 848 | 1,506 | 2,277 | 2,331 | 3,325 | 5,246 | 166,251 |
| Property Tax (Land) | 13 | 96 | 153 | 158 | 410 | 451 | 618 | 1,289 | 34,763 |
| Property Tax (Cattle) | 2 | 6 | 12 | 23 | 31 | 52 | 91 | 142 | 3,928 |
| Machinery/Equipment | $433 | $1,672 | $2,358 | $ 2,671 | $ 3,946 | $ 3,170 | $ 4,252 | $ 6,899 | $ 267,173 |
| Developments | $ 63 | $ 512 | $1,877 | $ 614 | $ 1,405 | $ 1,186 | $ 1,355 | $ 5,900 | $ 141,438 |
| TOTAL COSTS* | $858 | $4,199 | $9,006 | $10,852 | $17,722 | $19,055 | $ 27,893 | $ 52,262 | $1,519,186 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT AND CAPITAL | $ 31 | $1,589 | $ 619 | $ 2,430 | -$ 5,932 | $14,259 | $ 28,007 | $ 48,119 | $1,073,942 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-33

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR NO ACTION ALTERNATIVE IN THE LONG TERM

| | Subsistence Small (13 AUs)** | Subsistence Large (52 AUs)** | Small Commercial Small (92 AUs)** | Small Commercial Medium (134 AUs)** | Small Commercial Large (181 AUs)** | Medium Commercial Small (253 AUs)** | Medium Commercial Large (397 AUs)** | Large (746 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 29 | 19 | 8 | 5 | 8 | 12 | 8 | 13 | 102 |
| Livestock Adjustments from Existing Environment | +10% | -20% | +20% | 0% | 0% | -10% | -10% | 0% | |
| CASH RECEIPTS* | $ 651 | $3,978 | $11,610 | $15,342 | $21,358 | $32,359 | $51,980 | $ 99,502 | $2,532,589 |
| Cows | 234 | 1,687 | 2,774 | 2,629 | 3,844 | 8,119 | 11,176 | 18,687 | 534,695 |
| Yearlings Heifer (1-2 years) | -0- | -0- | 991 | -0- | 1,171 | 926 | 1,167 | 925 | 49,769 |
| Yearlings Steer (1-2 years) | -0- | -0- | -0- | -0- | 467 | 1,928 | 2,330 | 2,932 | 83,628 |
| Heifer Calves | 134 | 839 | 2,222 | 4,596 | 5,470 | 6,742 | 12,736 | 27,692 | 647,131 |
| Steer Calves | 283 | 1,452 | 5,226 | 7,308 | 9,548 | 12,572 | 22,002 | 44,760 | 1,099,287 |
| Bulls | -0- | -0- | 397 | 809 | 858 | 2,072 | 2,569 | 4,506 | 118,079 |
| NON-CASH RECEIPTS* | $ 134 | $ 276 | $ 547 | $ 360 | $ 541 | $ 468 | $ 750 | $ 880 | $ 42,690 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 134 | 276 | 547 | 360 | 541 | 468 | 750 | 880 | 42,690 |
| TOTAL RECEIPTS* | $ 785 | $4,254 | $12,157 | $15,702 | $21,899 | $32,827 | $52,730 | $100,382 | $2,575,279 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 68 | $ 400 | $ 1,150 | $ 1,939 | $ 2,840 | $ 3,036 | $ 4,530 | $ 8,087 | $ 228,990 |
| Leases/Grazing Fees: | $ 123 | $ 794 | $ 1,441 | $ 2,557 | $ 3,094 | $ 4,214 | $ 6,245 | $ 9,922 | $ 297,232 |
| BLM (AUM) | 85 | 444 | 787 | 1,273 | 1,548 | 1,725 | 2,311 | 3,902 | 125,860 |
| State (Acres) | 38 | 350 | 459 | 941 | 1,084 | 1,677 | 2,652 | 3,842 | 116,087 |
| Private (Acres) | -0- | -0- | 195 | 343 | 462 | 812 | 1,282 | 2,178 | 55,285 |
| Livestock Expenses: | $ 25 | $ 99 | $ 635 | $ 1,340 | $ 1,529 | $ 2,348 | $ 3,628 | $ 7,191 | $ 177,301 |
| Veterinary/Medicine | 25 | 99 | 184 | 268 | 362 | 557 | 873 | 1,865 | 46,227 |
| Bulls | -0- | -0- | 451 | 1,072 | 1,167 | 1,791 | 2,755 | 5,326 | 131,074 |
| Labor (Hired) | $ 18 | $ 203 | $ 437 | $ 966 | $ 1,493 | $ 2,510 | $ 4,288 | $ 7,632 | $ 188,289 |
| Other Expenses: | $ 78 | $ 402 | $ 1,022 | $ 1,845 | $ 2,717 | $ 2,816 | $ 4,152 | $ 6,685 | $ 202,950 |
| Miscellaneous | 66 | 325 | 877 | 1,601 | 2,382 | 2,277 | 3,204 | 5,252 | 163,398 |
| Property Tax (land) | 11 | 71 | 132 | 220 | 302 | 488 | 861 | 1,291 | 35,767 |
| Property Tax (cattle) | 1 | 6 | 13 | 24 | 33 | 51 | 87 | 142 | 3,785 |
| Machinery/Equipment | $ 375 | $1,536 | $ 2,332 | $ 3,024 | $ 3,721 | $ 3,183 | $ 4,486 | $ 6,908 | $ 267,491 |
| Developments | $ 55 | $ 383 | $ 1,617 | $ 851 | $ 1,034 | $ 1,285 | $ 1,890 | $ 5,908 | $ 141,679 |
| TOTAL COSTS* | $ 742 | $3,817 | $ 8,634 | $12,522 | $16,428 | $19,392 | $29,219 | $ 52,333 | $1,503,932 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT AND CAPITAL | $ 43 | $ 437 | $ 3,523 | $ 3,180 | $ 5,471 | $13,435 | $23,511 | $ 48,049 | $1,071,347 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-34

ESTIMATEO RECEIPTS, COSTS, ANO NET RETURNS PER RANCH SIZE CATEGORY
FOR LIVESTOCK AOJUSTMENT ALTERNATIVE IN THE LONG TERM

| | Subsistence Small (15 AUs)** | Subsistence Large (51 AUs)** | Small Commercial Small (86 AUs)** | Small Commercial Medium (124 AUs)** | Small Commercial Large (180 AUs)** | Medium Commercial Small (257 AUs)** | Medium Commercial Large (415 AUs)** | Large (691 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 27 | 15 | 8 | 9 | 5 | 13 | 9 | 12 | 98 |
| Livestock Adjustments From Existing Environment | +20% | -40% | +20% | +60% | -40% | 0% | +40% | -10% | |
| CASH RECEIPTS* | $ 746 | $ 5,485 | $ B,B56 | $13,983 | $26,311 | $33,706 | $54,901 | $ 92,075 | $2,467,854 |
| Cows | 234 | 2,901 | 2,026 | 2,367 | 9,867 | 7,597 | 11,994 | 17,150 | 549,186 |
| Yearlings-Heifers (1-2 years) | -0- | -0- | 789 | -0- | 776 | 555 | 1,141 | 1,140 | 41,356 |
| Yearlings-Steers (1-2 years) | -0- | -0- | -0- | -0- | 929 | 1,3B8 | 1,556 | 2,716 | 69,2B5 |
| Heifer Calves | 230 | B41 | 1,609 | 4,204 | 5,341 | 8,394 | 13,612 | 25,249 | 630,856 |
| Steer Calves | 282 | 1,743 | 4,024 | 6,9B5 | 8,545 | 14,554 | 24,091 | 41,094 | 1,070,690 |
| Bulls | -0- | -0- | 408 | 427 | 853 | 1,218 | 2,507 | 4,726 | 106,481 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $ 140 | $ 368 | $ 363 | $ 405 | $ 808 | $ 735 | $ 676 | $ B15 | $ 45,308 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Oomestic Consumption | 140 | 368 | 363 | 405 | 808 | 735 | 676 | 815 | 45,308 |
| TOTAL RECEIPTS* | $ 886 | $ 5,B53 | $ 9,219 | $14,388 | $27,119 | $34,441 | $55,577 | $ 92,B90 | $2,513,162 |
| COSTS OF OPERATION* | | | | | | | | | |
| Feed | $ 79 | $ 393 | $ 1,075 | $ 1,794 | $ 2,B24 | $ 2,932 | $ 4,735 | $ 7,490 | $ 217,505 |
| Lease/Grazing Fees: | $ 142 | $ 905 | $ 1,346 | $ 1,917 | $ 4,09B | $ 3,604 | $ 5,05B | $ 9,B06 | $ 275,966 |
| BLM (AUMs) | 98 | 436 | 735 | 1,178 | 1,539 | 1,496 | 2,415 | 3,614 | 117,914 |
| State (Acres) | 44 | 469 | 429 | 542 | 1,796 | 1,545 | 1,7B0 | 3,953 | 109,054 |
| Private (Acres) | -0- | -0- | 182 | 197 | 763 | 563 | 863 | 2,239 | 4B,998 |
| Livestock Expenses: | $ 29 | $ 97 | $ 593 | $ 866 | $ 1,328 | $ 2,171 | $ 3,694 | $ 7,215 | $ 169,465 |
| Veterinary/Medicine | 29 | 97 | 172 | 248 | 360 | 565 | 913 | 1,72B | 43,944 |
| Bulls | -0- | -0- | 421 | 618 | 968 | 1,606 | 2,781 | 5,487 | 125,521 |
| Labor (Hired) | $ 21 | $ 199 | 409 | $ B94 | 1,485 | $ 2,776 | $ 4,482 | $ 7,069 | $ 1B3,549 |
| Other Expenses: | $ 90 | $ 419 | $ 955 | $ 1,630 | $ 2,901 | $ 2,632 | $ 4,017 | $ 6,323 | $ 191,775 |
| Miscellaneous | 76 | 31B | 820 | 1,482 | 2,369 | 2,074 | 3,349 | 4,B65 | 154,04B |
| Property Tax (land) | 12 | 95 | 123 | 126 | 500 | 501 | 577 | 1,327 | 33,997 |
| Property Tax (cattle) | 2 | 6 | 12 | 22 | 32 | 57 | 91 | 131 | 3,730 |
| Machinery/Equipment | $ 426 | $ 1,673 | $ 2,1B0 | $ 2,523 | $ 4,342 | $ 2,822 | $ 4,221 | $ 6,5B5 | $ 252,149 |
| Oevelopments | $ 59 | $ 513 | $ 1,512 | $ 490 | $ 1,714 | $ 1,100 | $ 1,266 | $ 6,081 | $ 133,030 |
| TOTAL COST* | $ B46 | $ 4,199 | $ 8,070 | $10,114 | $18,692 | $18,037 | $27,473 | $50,569 | $1,423,439 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT ANO CAPITAL | $ 40 | $ 1,654 | $ 1,149 | $ 4,274 | $ 8,427 | $16,404 | $2B,104 | $42,321 | $1,0B9,723 |

*Oenotes 1975 Oollars
**Oenotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro Oistrict Grazing Files and Southwest Research and Oevelopment Co., 1977

TABLE A-35

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR PASTURE CAPACITY LEVEL ALTERNATIVE IN THE LONG TERM

| | Subsistence Small (20 AUs)** | Subsistence Large (49 AUs)** | Small Commercial Small (84 AUs)** | Small Commercial Medium (129 AUs)** | Small Commercial Large (169 AUs)** | Medium Commercial Small (226 AUs)** | Medium Commercial Large (420 AUs)** | Large (688 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 22 | 18 | 8 | 6 | 5 | 16 | 8 | 15 | 98 |
| Livestock Adjustments From Existing Environment | -20% | -20% | +20% | +10% | -40% | +20% | +20% | +30% | |
| CASH RECEIPTS* | $ 990 | $3,977 | $8,690 | $14,825 | $18,955 | $28,553 | $54,220 | $91,726 | $2,613,109 |
| Cows | 473 | 1,685 | 2,022 | 2,361 | 3,544 | 7,316 | 12,085 | 17,042 | 558,164 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 787 | -0- | 701 | 958 | 907 | 1,135 | 49,410 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 913 | 1,356 | 2,071 | 1,858 | 70,699 |
| Heifer Calves | 234 | 837 | 1,603 | 4,467 | 4,945 | 6,052 | 13,595 | 25,539 | 673,242 |
| Steer Calves | 283 | 1,455 | 3,880 | 7,162 | 8,051 | 12,091 | 23,932 | 41,996 | 1,161,535 |
| Bulls | -0- | -0- | 398 | 835 | 801 | 780 | 1,630 | 4,156 | 100,059 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $ 283 | $ 285 | $ 354 | $ 359 | $ 563 | $ 513 | $ 685 | $ 798 | $ 44,815 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 283 | 285 | 354 | 359 | 563 | 513 | 685 | 798 | 44,815 |
| TOTAL RECEIPTS* | $1,273 | $4,262 | $9,044 | $15,184 | $19,518 | $29,066 | $54,905 | $92,524 | $2,657,924 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 105 | $ 377 | $1,050 | $ 1,867 | $ 2,652 | $ 2,712 | $ 4,792 | $ 7,458 | $ 235,556 |
| Lease/Grazing Fees: | $ 216 | $ 748 | $1,315 | $ 2,345 | $ 3,849 | $ 3,216 | $ 5,569 | $ 7,870 | $ 276,109 |
| BLM (AUMs) | 131 | 418 | 718 | 1,226 | 1,445 | 1,541 | 2,444 | 3,598 | 128,909 |
| State (Acres) | 85 | 330 | 455 | 820 | 1,687 | 1,128 | 2,104 | 2,724 | 100,257 |
| Private (Acres) | -0- | -0- | 178 | 299 | 717 | 547 | 1,021 | 1,548 | 46,943 |
| Livestock Expenses: | $ 38 | $ 93 | $ 580 | $ 1,193 | $ 1,247 | $ 1,699 | $ 3,658 | $ 6,763 | $ 178,436 |
| Veterinary/Medicine | 38 | 93 | 168 | 258 | 338 | 497 | 924 | 1,720 | 48,236 |
| Bulls | -0- | -0- | 412 | 935 | 909 | 1,202 | 2,734 | 5,043 | 130,200 |
| Labor (Hired) | $ 28 | $ 191 | $ 399 | $ 930 | $ 1,394 | $ 2,242 | $ 4,536 | $ 7,038 | $ 197,526 |
| Other Expenses: | $ 128 | $ 379 | $ 933 | $ 1,756 | $ 2,724 | $ 2,407 | $ 4,166 | $ 5,890 | $ 201,448 |
| Miscellaneous | 101 | 306 | 801 | 1,542 | 2,224 | 2,034 | 3,389 | 4,844 | 166,826 |
| Property Tax (Land) | 25 | 67 | 120 | 191 | 470 | 328 | 685 | 915 | 30,665 |
| Property Tax (Cattle) | 2 | 6 | 12 | 23 | 30 | 45 | 92 | 131 | 3,957 |
| Machinery/Equipment | $ 636 | $1,447 | $2,129 | $ 2,841 | $ 4,076 | $ 2,647 | $ 4,414 | $ 5,986 | $ 261,950 |
| Developments | $ 122 | $ 361 | $1,477 | $ 742 | $ 1,609 | $ 861 | $ 1,499 | $ 4,197 | $ 122,218 |
| TOTAL COST* | $1,273 | $3,596 | $1,883 | $11,674 | $17,551 | $15,784 | $28,634 | $45,202 | $1,473,243 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT, AND CAPITAL | $ -0- | -$ 666 | $1,161 | $ 3,510 | $ 1,967 | $13,282 | $26,271 | $47,322 | $1,184,681 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-36

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR ENHANCEMENT OF SENSITIVE RESOURCE VALUES ALTERNATIVE IN THE LONG TERM

| | Subsistence Small (13 AUs)** | Subsistence Large (50 AUs)** | Small Commercial Small (93 AUs)** | Small Commercial Medium (135 AUs)** | Small Commercial Large (170 AUs)** | Medium Commercial Small (263 AUs)** | Medium Commercial Large (406 AUs)** | Large (851 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 20 | 20 | 8 | 6 | 5 | 14 | 10 | 15 | 98 |
| Livestock Adjustments From Existing Environment | -30% | -20% | +20% | +20% | -40% | +10% | +50% | +30% | |
| CASH RECEIPTS* | $702 | $4,075 | $9,869 | $15,681 | $19,362 | $33,904 | $53,669 | $92,090 | $2,758,084 |
| Cows | 470 | 1,731 | 2,285 | 2,651 | 3,565 | 8,737 | 11,770 | 17,234 | 594,559 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 798 | -0- | 801 | 963 | 719 | 1,135 | 48,086 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 957 | 1,638 | 1,670 | 2,030 | 74,367 |
| Heifer Calves | 232 | 860 | 1,855 | 4,741 | 5,090 | 7,335 | 13,199 | 25,539 | 708,341 |
| Steer Calves | -0- | 1,484 | 4,490 | 7,474 | 8,070 | 13,984 | 23,909 | 41,996 | 1,215,600 |
| Bulls | -0- | -0- | 441 | 815 | 879 | 1,247 | 2,452 | 4,156 | 117,131 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $172 | $ 380 | $ 392 | $ 375 | $ 388 | $ 552 | $ 662 | $ 682 | $ 42,944 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 172 | 380 | 392 | 375 | 388 | 552 | 662 | 682 | 42,944 |
| TOTAL RECEIPTS* | $874 | $4,455 | $10,261 | $16,056 | $19,750 | $34,456 | $54,331 | $92,772 | $2,801,028 |
| COST OF OPERATION* | | | | | | | | | |
| Feed | $ 68 | $ 385 | $ 1,163 | $ 1,953 | $ 2,667 | $ 3,156 | $ 4,632 | $ 7,458 | $ 245,791 |
| Lease/Grazing Fees: | $147 | $ 765 | $ 913 | $ 2,361 | $ 3,872 | $ 3,924 | $ 4,779 | $ 7,870 | $ 279,846 |
| BLM (AUMs) | 85 | 427 | 195 | 1,283 | 1,454 | 1,796 | 2,363 | 3,598 | 129,512 |
| State (Acres) | 62 | 338 | 504 | 790 | 1,697 | 1,433 | 1,628 | 2,724 | 102,459 |
| Private (Acres) | -0- | -0- | 214 | 288 | 721 | 695 | 788 | 1,548 | 47,875 |
| Livestock Expenses: | $ 25 | $ 95 | $ 681 | $ 1,170 | $ 1,255 | $ 2,106 | $ 3,853 | $ 6,763 | $ 190,602 |
| Veterinary/Medicine | 25 | 95 | 186 | 270 | 340 | 578 | 893 | 1,720 | 50,030 |
| Bulls | -0- | -0- | 495 | 900 | 915 | 1,528 | 2,960 | 5,043 | 140,572 |
| Labor (Hired) | $ 18 | $ 195 | $ 442 | $ 973 | $ 1,403 | $ 2,609 | $ 4,385 | $ 7,038 | $ 206,595 |
| Other Expenses: | $ 85 | $ 386 | $ 1,043 | $ 1,821 | $ 2,741 | $ 2,838 | $ 3,893 | $ 5,890 | $ 209,407 |
| Miscellaneous | 66 | 312 | 886 | 1,613 | 2,237 | 2,367 | 3,276 | 4,844 | 174,069 |
| Property Tax (Land) | 18 | 68 | 144 | 184 | 473 | 419 | 528 | 915 | 31,212 |
| Property Tax (Cattle) | 1 | 6 | 13 | 24 | 31 | 52 | 89 | 131 | 4,126 |
| Machinery/Equipment | $429 | $1,476 | $ 2,402 | $ 2,915 | $ 4,100 | $ 3,142 | $ 4,072 | $ 5,986 | $ 269,818 |
| Developments | $ 89 | $ 368 | $ 1,774 | $ 714 | $ 1,618 | $ 1,097 | $ 1,157 | $ 4,197 | $ 125,589 |
| TOTAL COST* | $861 | $3,670 | $ 8,418 | $11,907 | $17,656 | $18,873 | $26,771 | $45,202 | $1,527,648 |
| NET RETURNS TO OPERATOR, LABOR, MANAGEMENT, AND, CAPITAL | $ 13 | $ 785 | $ 1,843 | $ 4,149 | $ 2,094 | $15,583 | $27,560 | $47,570 | $1,273,380 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial—Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

TABLE A-37

ESTIMATED RECEIPTS, COSTS, AND NET RETURNS PER RANCH SIZE CATEGORY
FOR NO GRAZING ALTERNATIVE IN THE LONG TERM

| | Subsistence Small (10 AUs)** | Subsistence Large (46 AUs)** | Small Commercial Small (89 AUs)** | Small Commercial Medium (129 AUs)** | Small Commercial Large (193 AUs)** | Medium Commercial Small (249 AUs)** | Medium Commercial Large (415 AUs)** | Large (671 AUs)** | Total ES Area |
|---|---|---|---|---|---|---|---|---|---|
| Number of Operators | 38 | 18 | 7 | 2 | 2 | 6 | 9 | 5 | 87 |
| Livestock Adjustments From Existing Environment | +10% | -30% | 0 | -60% | -70% | -60% | +30% | -70% | |
| CASH RECEIPTS* | $ 637 | $3,128 | $9,241 | $14,534 | $21,852 | $30,374 | $55,212 | $87,083 | $1,332,536 |
| Cows | 237 | 1,213 | 2,007 | 2,121 | 4,420 | 8,163 | 12,077 | 16,809 | 299,687 |
| Yearling Heifers (1-2 Years) | -0- | -0- | 781 | 592 | 795 | 965 | 979 | 832 | 27,002 |
| Yearling Steers (1-2 Years) | -0- | -0- | -0- | -0- | 1,857 | 1,150 | 1,872 | 1,651 | 35,717 |
| Heifer Calves | 117 | 604 | 1,853 | 4,198 | 5,620 | 6,601 | 13,612 | 25,102 | 335,549 |
| Steer Calves | 283 | 1,311 | 4,178 | 6,343 | 7,413 | 12,208 | 24,091 | 38,059 | 571,472 |
| Bulls | -0- | -0- | 422 | 1,280 | 1,747 | 1,287 | 2,581 | 4,630 | 63,109 |
| Horses | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| NON-CASH RECEIPTS* | $ 141 | $ 385 | $ 376 | $ 410 | $ 384 | $ 561 | $ 813 | $ 560 | $ 29,991 |
| Livestock Inventory Change | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- | -0- |
| Domestic Consumption | 141 | 385 | 376 | 410 | 384 | 561 | 813 | 560 | 29,991 |
| TOTAL RECEIPTS* | $ 778 | $3,513 | $9,617 | $14,944 | $22,236 | $30,935 | $56,025 | $87,643 | $1,362,527 |
| COST of OPERATION* | | | | | | | | | |
| Feed | $ 53 | $ 354 | $1,113 | $1,867 | $ 3,028 | $ 2,988 | $ 4,735 | $ 7,274 | $ 122,880 |
| Lease/Grazing Fees: | $ 97 | $ 751 | $1,521 | $4,317 | $ 7,081 | $ 7,226 | $ 5,262 | $21,559 | $ 249,156 |
| BLM (AUMs) | 65 | 393 | 761 | 1,226 | 1,650 | 1,698 | 2,415 | 3,509 | 70,091 |
| State (Acres) | 32 | 358 | 533 | 2,265 | 3,812 | 3,725 | 1,917 | 11,521 | 120,753 |
| Private (Acres) | -0- | -0- | 227 | 826 | 1,619 | 1,803 | 930 | 6,529 | 58,312 |
| Livestock Expenses: | $ 19 | $ 87 | $ 701 | $1,548 | $ 2,440 | $ 1,873 | $ 3,905 | $ 7,006 | $ 96,584 |
| Veterinary/Medicine | 19 | 87 | 178 | 258 | 386 | 548 | 913 | 1,678 | 24,717 |
| Bulls | -0- | -0- | 523 | 1,290 | 2,054 | 1,325 | 2,992 | 5,328 | 71,867 |
| Labor (Hired) | $ 14 | $ 179 | $ 423 | $ 930 | $ 1,592 | $ 2,470 | $ 4,482 | $ 6,864 | $ 101,237 |
| Other Expenses: | $ 61 | $ 366 | $1,013 | $2,093 | $ 3,637 | $ 3,377 | $ 4,038 | $ 8,723 | $ 127,676 |
| Miscellaneous | 51 | 287 | 848 | 1,542 | 2,540 | 2,241 | 3,349 | 4,724 | 88,411 |
| Property Tax (Land) | 9 | 73 | 153 | 528 | 1,062 | 1,086 | 598 | 3,872 | 37,165 |
| Property Tax (Cattle) | 1 | 6 | 12 | 23 | 35 | 50 | 91 | 127 | 2,100 |
| Machinery/Equipment | $ 294 | $1,422 | $2,358 | $4,049 | $ 6,336 | $ 4,231 | $ 4,250 | $ 9,984 | $ 187,600 |
| Developments | $ 46 | $ 391 | $1,877 | $2,049 | $ 3,634 | $ 2,852 | $ 1,316 | $17,714 | $ 150,817 |
| TOTAL COST* | $ 584 | $3,550 | $9,006 | $16,853 | $27,748 | $25,017 | $27,988 | $79,124 | $1,035,950 |
| NET RETURNS TO OPERATOR LABOR, MANAGEMENT AND CAPITAL | $ 194 | -$ 37 | $ 611 | -$1,909 | -$5,512 | $ 5,918 | $28,037 | $ 8,519 | $ 326,577 |

*Denotes 1975 Dollars
**Denotes Average Ranch Size
Note: Ranch Sizes: Subsistence Small (1-29 AUs); Subsistence Large (30-69 AUs); Small Commercial Small (70-110 AUs); Small Commercial Medium (111-150 AUs); Small Commercial Large (151-199 AUs); Medium Commercial Small (200-309 AUs); Medium Commercial Large (310-499 AUs); Large (500+ AUs)

Source: BLM Socorro District Grazing Files and Southwest Research and Development Co., 1977

# APPENDIX 7

RECREATION


| | Page |
|---|---|
| Methodology For Determination of Estimated Recreation Use | A-104 |
| Table A-38 Methodology for Determination of Estimated Recreation Use | A-105 |

METHODOLOGY FOR DETERMINATION OF ESTIMATED RECREATION USE

Recreation use for the ES Area was estimated primarily from the 1976 New Mexico State Comprehensive Outdoor Recreation Plan (SCORP). From 35 outdoor recreation activities listed, ten were selected as being of significant relevance to public lands in the ES Area. Those selected were:

| | |
|---|---|
| Photography/Painting | Hiking |
| Birdwatching | Trailbiking/4-Wheeling |
| Sight-seeing | Sport Shooting |
| Picknicking | Big Game Hunting |
| Camping | Small Game Hunting |

The existing and projected recreation use figures (Table A-38, p. 105) were calculated from populations of Planning District 7 (Sierra, Dona Ana, and Socorro Counties). This planning unit was selected as having population characteristics most representative of the ES Area. A sample survey of 2,600 was made. It projected recreation demand in the planning districts, based on population characteristics. The survey determined recreation use estimates for Planning District 7 having a total population of 95,000.

The population of Socorro County is 9,300 (NM SCORP, 1976), 9.78 percent of Planning District 7's population of 95,000. Ten selected activities for the Stallion Planning Unit were calculated, using 9.7 percent of Planning District 7's demand figures.

It was determined that the total population of 8,989 of adjacent communities had a significant effect on the recreation use in the Ladron Planning Unit. The Planning Unit is split between Planning Districts 7 and 3. It was felt that the rural characteristics of the population in and adjacent to the planning unit were more reflective of Planning District 7 than of 3, which has the urban population of Albuquerque. The Ladron Planning Unit's population is 9.46 percent of District 7's population. Therefore, data from Planning District 7 was extrapolated, using 9.46 percent of the active demand figures.

The recreation use figures, calculated above, were then subjected an interdisciplinary review by BLM resource specialists. This review resulted in an adjustment to the use figures based on the specialist's expertise and field observations.

The New Mexico SCORP projected an average 43-percent increase between existing use and that occurring in 1990. This rate of increase was used in the calculations for projected use in the long term.

Table A-38, p. 105, illustrates the total extrapolation process.

TABLE A-38

METHODOLOGY FOR DETERMINATION OF ESTIMATEO RECREATION USE (LONG TERM)

| SELECTED RECREATION ACTIVITIES | LADRON PLANNING UNIT | | STALLION PLANNING UNIT | | ES AREA (TOTAL OF P.U.) | | % of | ES AREA (FINAL AOJUSTEO) | |
|---|---|---|---|---|---|---|---|---|---|
| | Existing | Projected | Existing | Projected | Existing | Projected | Adjustment | Existing | Projected |
| Photography/Painting | 7,414 | 10,602 | 7,665 | 10,961 | 15,079 | 21,562 | 10 | 1,508 | 2,156 |
| Birdwatching | 12,043 | 17,221 | 12,450 | 17,804 | 24,493 | 35,025 | 10 | 2,449 | 3,503 |
| Sight-seeing | 12,043 | 17,221 | 12,450 | 17,804 | 24,493 | 35,025 | 20 | 4,899 | 7,006 |
| Picnicking | 16,806 | 24,033 | 17,374 | 24,845 | 34,180 | 48,878 | 2 | 683 | 977 |
| Camping | 4,844 | 6,927 | 7,889 | 11,281 | 12,733 | 18,208 | 2 | 255 | 364 |
| Hiking | 7,324 | 10,474 | 7,572 | 10,828 | 14,896 | 21,302 | 15 | 2,234 | 3,195 |
| Trailbiking/4-Wheeling | 11,144 | 15,936 | 11,520 | 16,474 | 22,664 | 32,410 | 1 | 227 | 324 |
| Sport/Shooting | 2,400 | 3,431 | 2,480 | 3,546 | 4,880 | 6,978 | 70 | 3,416 | 4,885 |
| Big Game Hunting | 3,424 | 4,896 | 3,540 | 5,062 | 6,964 | 9,959 | 85 | 5,919 | 8,465 |
| Small Game Hunting | 10,065 | 14,394 | 10,406 | 14,880 | 20,471 | 29,274 | 65 | 13,306 | 19,028 |
| | 9.46% of SCORP Planning Oistrict 7 Demand 1/ | 43 % Increase | 9.78 % of SCORP Planning District 7 Demand | 43 % Increase | | | | | |

1/ Demand - The term "Oemand" is used as a measurement of participation levels, 1976 N. M. SCORP

Source: BLM Socorro District Files, SCORP, 1976.

# APPENDIX 8

VISUAL RESOURCES


| | Page |
|---|---|
| Methodology for Determining Visual Resource Management (VRM) Classes | A-106 |
| Figure A-17 Scenery Quality Inventory Chart | A-107 |
| Figure A-18 Visual Resource Class Determination Matrix | A-108 |
| Visual Resource Contract Ratings of Typical Range Developments | A-109 |
| Table A-39 Visual Resource Contrast Ratings of Typical Range Developments | A-110 |
| Table A-40 Acres per Visual Resource Management Class (by Allotment) | A-113 |

# METHODOLOGY FOR DETERMINING VISUAL RESOURCE MANAGEMENT (VRM) CLASSES

VRM classes are determined by a combination of three factors:

Scenic quality  Visual sensitivity levels  Distance zones

Scenic quality is derived from assigning a scenery class to physiographic areas based on several criteria (Figure A-17). Three quality ratings result from this process:

A - Outstanding  B - Above average  C - Average

Visual sensitivity levels are an index of the relative importance of visual resources to an area. The resultant sensitivity levels are categorized as:

High  Medium  Low

Commonly considered criteria are:

1. Traffic counts for highways, roads, and trails;
2. Traditional land use - Resource Associations of local, regional and national significance;
3. Community attitudes;
4. Existing and proposed land uses; and
5. Other agency uses and attitudes.

Distance zones are determined by the distance from which the resource is being viewed. These are usually mapped from the major routes of travel in the resource area. Distance zones are delineated and labeled according to the following criteria:

Foreground - Middleground: From 0 to 5 miles.

Background - From 3 to 15 miles.

Seldom seen - Beyond 15 miles. Areas which are screened or hidden from the normal viewing points.

After the three factors of visual sensitivity, visual zones, and scenic quality for the physiographic areas have been determined, they are inserted into the VRM Matrix (Figure A-18) which decides the final VRM class.

6310 - VISUAL RESOURCE INVENTORY AND EVALUATION

Scenery Quality Inventory Chart

| KEY FACTORS | RATING CRITERIA AND SCORE | | |
|---|---|---|---|
| (1) LAND FORM | Vertical or near vertical cliffs, spires, highly eroded formations, massive rock outcrops, severe surface variation. 4 | Steep canyon walls, mesas, interesting erosional patterns, variety in size & shape of land forms. 2 | Rolling hills, foothills, flat valley bottoms. 1 |
| (2) COLOR | Rich color combinations variety or vivid contrasts in the color of soil, rocks, vegetation or water. 4 | Some variety in colors and contrast of the soil, rocks & vegetation, but not dominant. 2 | Subtle color variations, little contrast, generally muted tones. Nothing really eye-catching. 1 |
| (3) WATER | Still, chance for reflections or cascading white water, a dominant factor in the landscape. 4 | Moving and in view or still but not dominant. 2 | Absent, or present but seldom seen. 1 |
| (4) VEGETATION | A harmonious variation in form, texture, pattern, and type. 4 | Some variation in pattern and texture, but only one or two major types. 2 | Little or no variation, contrast lacking. 1 |
| (5) UNIQUENESS | One of a kind or very rare within region. 6 | Unusual but similar to others within the region. 2 | Interesting in its setting, but fairly common within the region. 1 |
| (6) INTRUSIONS | Free from aesthetically undesirable or discordant sights and influences. 2 | Scenic quality is somewhat depreciated by inharmonous intrusions but not so extensive that the scenic qualities are entirely negated. 1 | Intrusions are so extensive that scenic qualities are for the most part nullified. -4 |

Scenery A = 15-24

Scenery B = 10-14

Scenery C = 1-9

EXPLANATION OF RATING CRITERIA

(1) Land Form or topography becomes more interesting as it gets steeper and more massive. Examples of outstanding land forms are found in the Grand Canyon, the Sawtooth Mountain Range in Idaho, the Wrangle Mountain Range in Alaska, and the Rocky Mountain National Park.

(2) Color. Consider the overall color of the basic components of the landscape (i.e., soil, rocks, vegetation, etc.) as they appear during the high-use season. Key factors to consider in rating "color" are variety, contrast, and harmony.

(3) Water is the ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

(4) Vegetation. Give primary consideration to the variety of patterns, forms, and texture created by the vegetation.

(5) Uniqueness. This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique within any one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing scenery - the uniqueness factor can be used to recognize this type of area and give it the added emphasis it needs.

(6) Intrusions. Consider the impact of man-made improvements on the aesthetic quality. These intrusions can have a positive or negative aesthetic impact. Rate accordingly.

INSTRUCTIONS (See .1 for general procedures.)

Purpose: To rate the aesthetic quality of the scenic resource on all BLM lands.

How to Identify Scenery Value: All Bureau lands have scenic value.

How to Determine Minimum Suitability: All BLM lands are rated for scenic values. Also rate adjacent or intermingling non-BLM lands.

How to Delineate Rating Areas: Consider the following factors when delineating rating areas:

1. Like physiographic characteristics (i.e., land form, vegetation, etc.)
2. Similar visual patterns, texture, color, variety, etc.
3. Areas which have a similar impact from intrusions (i.e., roads, structures, mining operations, or other surface disturbances).

Source: BLM Manual 6310

Rel. 6-55
11/7/75

Figure A-17. Scenery Quality Inventory Chart

| | | VISUAL SENSITIVITY LEVEL 2/ | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | HIGH | | | MEDIUM | | | LOW |
| SPECIAL AREAS | | I | I | I | I | I | I | I |
| SCENERY CLASS 1/ | A | II | II | II | II | II | II | II |
| | B | II | III | IV | III | IV | IV | IV |
| | C | III | IV | IV | IV | IV | IV | IV |
| | | FG | BG | SS | FG | BG | SS | SS |
| | | VISUAL ZONES 3/ | | | | | | |

1/ SCENERY QUALITY INVENTORY A, B, C

2/ VISUAL SENSITIVITY LEVEL High
Medium
Low

3/ VISUAL ZONES FG - Foreground-Middleground
BG - Background
SS - Seldom Seen

Note: Class I applies only to classified special areas, e.g., wilderness, primitive, natural areas, etc. The quality standard is established through legislation or policy.

Source: BLM Visual Resource Mannual 8410

Figure A-18. Visual Resource Class Determination Matrix

# VISUAL RESOURCE CONTRAST RATINGS OF TYPICAL RANGE DEVELOPMENTS

A contrast rating was made for each project category evaluating the degree of change in form, line, color, and texture of the major features (Table A-39 p. 110). The basic elements have been weighted as follows to indicate their relative importance in detecting changes in contrast: form (4), line (3), color (2), and texture (1). By assigning values that indicate degree of contrast, 3 for strong, 2 for moderate, 1 for weak and 0 for none, a direct multiplier for an indication of the strength of the contrast can be set up. For example, if the construction of a water storage tank would create a strong change in form of the area, the following calculation would indicate the strength of the contrast, i.e., [form (4)1 x [strong (3)] = 12. In this example, the degree of contrast for change in form is 12. This would be added to the degree of contrast for the other three basic elements for the total contrast rating. Standards for meeting VRM classes are as follows:

Class I - The degree of contrast for any one element may not exceed 1 (weak) and the total contrast rating for any feature must be less than 10.

Class II - The degree of contrast for any one element should not exceed 2 (moderate) and the total contrast rating for any feature may not exceed 10.

Class III - The degree of contrast for any one element should not exceed 2 (moderate) and the total contrast for any one feature may not exceed 16.

Class IV - The total contrast rating for any feature should not exceed 20.

A total score for each feature of 1 to 10 indicates the contrast can be seen, but does not attract attention; 11 to 20 attracts attention and the contrast begins to dominate the characteristic landscape; 21 to 30 demands attention and will not be overlooked.

TABLE A-39

VISUAL RESOURCE CONTRAST RATINGS OF TYPICAL RANGE DEVELOPMENTS



| Proposed Project | Feature | Element | | Contrast | | Score |
|---|---|---|---|---|---|---|
| Pipelines | Vegetation (Short term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Strong (3) | = | 9 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 16 |
| | Total score 16 (max. for 30) indicated moderate contrast. | | | | | |
| | Vegetation (Long term) | Form (4) | x | None - | = | 0 |
| | | Line (3) | x | Strong (3) | = | 9 |
| | | Color (2) | x | Weak (2) | = | 4 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 14 |
| | Score of 14 (max. of 30) indicates weak contrast. | | | | | |
| Earthen Reservoir | Land surface and vegetation (Short and long term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Mod. (2) | = | 6 |
| | | Color (2) | x | Strong (3) | = | 6 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 22 |
| | Land surface and vegetation total score of 22 (max. of 30) indicates moderate contrast. | | | | | |
| Wildlife Waters | Land surface and vegetation (Short term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 11 |
| | Land surface and vegetation score of 11 (max. 30) indicate weak contrast. | | | | | |
| | Land surface and vegetation (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 11 |
| | Land surface and vegetation score of 11 (max. 30) indicates weak contrast. | | | | | |
| | Structures (Short term) | Forms (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates weak to moderate contrast. | | | | | |
| | Structures (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 11 |
| | Total score of 11 (max. 30) indicates weak contrast. | | | | | |
| Maintenance Roads | Land form and vegetation (Short term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Strong (3) | = | 9 |
| | | Color (2) | x | Strong (3) | = | 6 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 24 |
| | Land form and vegetation score of 24 (max. 30) indicates strong contrast. | | | | | |
| Maintenance Roads | Land form and vegetation (Long term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Mod. (2) | = | 6 |
| | | Color (2) | x | Mod. (2) | = | 4 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 19 |
| | Land form and vegetation score of 19 (max. 30) indicates moderate contrast. | | | | | |
| Temporary Roads | Vegetation (Short term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Strong (3) | = | 9 |
| | | Color (2) | x | Mod. (2) | = | 4 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 23 |
| | Total score of 23 (max. 30) indicates strong contrast. | | | | | |
| | Vegetation (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Mod. (2) | = | 6 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | None (0) | = | 0 |
| | | | | | | 12 |
| | Total score of 12 (max. 30) indicates weak contrast. | | | | | |

TABLE A-39 (continued)

VISUAL RESOURCE CONTRAST RATINGS OF TYPICAL RANGE DEVELOPMENTS



| Proposed Project | Feature | Element | | Contrast | | Score |
|---|---|---|---|---|---|---|
| Fences | Structure (Short term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (2) | x | Mod. (3) | = | 6 |
| | | Color (2) | x | Mod. (2) | = | 4 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates moderate contrast. | | | | | |
| | Structure (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Mod. (2) | = | 6 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 13 |
| | Total score of 13 (max. 30) indicates weak contrast. | | | | | |
| Sacrifice Areas | Vegetation (Short term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Strong (3) | = | 9 |
| | | Color (2) | x | Strong (3) | = | 6 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 21 |
| | Total score of 21 (max. 30) indicates strong contrast. | | | | | |
| | Vegetation (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Mod. (2) | = | 6 |
| | | Color (2) | x | Strong (3) | = | 6 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 17 |
| | Total score of 17 (max. 30) indicates moderate contrast. | | | | | |
| Wells | Structure (Short term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates weak to moderate contrast. | | | | | |
| | Structure (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 11 |
| | Total score of 11 (max. 30) indicates weak contrast. | | | | | |
| Springs | Structure (Short term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates weak to moderate contrast. | | | | | |
| | Structure (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 11 |
| | Total score of 11 (max. 30) indicates weak contrast. | | | | | |
| Storage Tanks | Vegetation (Short term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | Strong (3) | = | 9 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 16 |
| | Total score of 16 (max. 30) indicates moderate contrast. | | | | | |
| | Vegetation (Long term) | Form (4) | x | Weak (1) | = | 4 |
| | | Line (3) | x | None (0) | = | 0 |
| | | Color (2) | x | Mod. (2) | = | 4 |
| | | Texture (1) | x | Weak (1) | = | 1 |
| | | | | | | 9 |
| | Total score of 9 (max. 30) indicates low contrast. | | | | | |
| Troughs | Structures (Short term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates moderate contrast. | | | | | |

TABLE A-39 (continued)

VISUAL RESOURCE CONTRAST RATINGS OF TYPICAL RANGE DEVELOPMENTS



| Proposed Project | Feature | Element | | Contrast | | Score |
|---|---|---|---|---|---|---|
| Troughs (continued) | Structures (Long term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates weak to moderate contrast. | | | | | |
| Cattleguards | Structures (Short term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates weak to moderate contrast. | | | | | |
| | Structures (Long term) | Form (4) | x | Mod. (2) | = | 8 |
| | | Line (3) | x | Weak (1) | = | 3 |
| | | Color (2) | x | Weak (1) | = | 2 |
| | | Texture (1) | x | Mod. (2) | = | 2 |
| | | | | | | 15 |
| | Total score of 15 (max. 30) indicates weak to moderate contrast. | | | | | |

Source: BLM Socorro District Files

TABLE A-40

ACRES PER VISUAL RESOURCE MANAGEMENT CLASS (BY ALLOTMENT)



| | Class I | Class II | Class III | Class IV | Class V |
|---|---|---|---|---|---|
| AMPs /1 | | | | | |
| 002 Mesa Carrizo | | 2,000 | | 46,523 | |
| 006 Ojo Saladito | | 400 | 12,696 | 635 | |
| 012 Riley Community | | | 2,729 | | |
| 016 Puertecito & Barranco | | | 22,957 | 2,880 | |
| 036 Rio Puerco | | | 6,048 | 6,048 | |
| 037 Chavez Community | 2,080 | | 11,996 | | |
| 052 Cerro Colorado | | | | 2,096 | |
| 058 Canon Alamito | | | 4,577 | | |
| 059 La Jencia | 1,240 | | 26,450 | | |
| 065 Arroyo Lucero | | 640 | 9,833 | 22,619 | |
| 077 Ladron Peak | 1,840 | | 4,733 | | |
| 081 Lopez Community | | | 5,789 | | 400 |
| 083 Big Sandy Wash | | | | 634 | |
| 086 West Ladron | 4,600 | | 23,282 | | |
| 089 Tsidu-Weza | | | | 644 | |
| 090 Petoch Wash | | | | 13,899 | |
| 091 Canada Colorado | | | 7,474 | | |
| 114 Cerro de Oro | | | 23,000 | 23,573 | |
| 121 Rio Salado West | | | 9,708 | | |
| 122 Abeytas | | | | 2,217 | 3,200 |
| 129 Arroyo Colorado | | 1,520 | | 70,825 | |
| 131 Los Valles | | | | 10,940 | |
| 152 Cerro Verde | | 180 | 1,280 | 30,618 | |
| 250 Milligan Gulch | | | 12,525 | 5,445 | |
| 251 Harless | | | | 17,196 | |
| 252 Fernandez-Maestas | | | | 21,285 | |
| 253 Vigil Individual | | | | 3,117 | |
| 254 Bordo Atravesado | | | | 25,163 | |
| 255 Bosquecito | | | | 6,127 | |
| 256 Llano | | | | 15,787 | |
| 258 Ojo de Amado | | | 80 | 12,791 | |
| 260 Sierra Larga | | | | 18,395 | |
| 261 Sheep Canyon | | | 16,919 | 13,199 | |
| 262 Las Canas | | | 960 | 22,439 | |
| 263 Black Mesa | | | 8,900 | 12,700 | |
| 264 Armijo Community | | | 3,400 | 7,240 | |
| 266 Coyote Spring | | | | 13,517 | |
| 268 Torreon | | | 13,756 | 22,139 | |

TABLE A-40 (continued)

ACRES PER VISUAL RESOURCE MANAGEMENT CLASS (BY ALLOTMENT)



| | Class I | Class II | Class III | Class IV | Class V |
|---|---|---|---|---|---|
| AMPs (continued) | | | | | |
| 271 Mesa Redonda | | | | 20,155 | |
| 272 San Pasqual - River | | | | 22,622 | |
| 275 Adobe, Hasenburg, Padilla | | | | 73,224 | |
| 276 C. A. Bar | | | | 3,040 | |
| 277 San Jose Canyon | | 1,624 | 21,228 | 3,840 | |
| 279 Silver Canyon | | | 10,623 | 10,535 | |
| 280 Tecolote Draw | | | | 18,029 | |
| 283 Blackington Mountain | | | 2,560 | 20,300 | |
| 284 Mesa Canyon Well | | | | 11,662 | |
| 285 Sand Mountain | | | | 27,875 | |
| 287 Gabaldon Individual | | | | 5,114 | |
| 288 Rio Grande | | | | 5,302 | |
| 289 Jornada Community | | | | 10,670 | |
| 290 Rock Springs Canyon | | | 390 | 12,336 | |
| 291 Prairie Spring | | | | 10,626 | |
| 293 Malpais | | | 3,692 | 39,209 | |
| 294 Nogal | | | 2,649 | 8,882 | |
| 295 Antelope Well | | | | 21,165 | |
| 297 Puertecito del Lemitar | | | 18,667 | 1,329 | |
| 298 Belcher-Corn | | | | 7,516 | |
| 299 Pequeno | | | 12,934 | | |
| 300 Lucero Individual | | | | 3,499 | |
| 301 Bennett-Wilson | | | | 31,703 | |
| 303 Carthage | | | | 707 | |
| 306 Veranito | | | | 6,160 | |
| 308 Padilla Community | | | 5,527 | | |
| 312 La Arenosa | | | 1,156 | 8,294 | |
| 315 Polvadera Community | | | 1,967 | 2,361 | |
| 317 San Pedro | | | 935 | 2,810 | |
| 318 Pueblito Community | | | | 5,328 | |
| 321 Puertecito Gap | | | | 11,573 | |
| 322 Parida | | | | 17,566 | |
| 323 Water Canyon | | | 874 | 12,443 | |
| 325 West Williams | | | | 13,866 | |
| 327 Cedar Pass | | | | 11,813 | |
| 328 Canon Quemado | | | | 6,410 | |
| 330 East Williams | | | | 8,124 | |

TABLE A-40 (continued)

ACRES PER VISUAL RESOURCE MANAGEMENT CLASS (BY ALLOTMENT)



| | Class I | Class II | Class III | Class IV | Class V |
|---|---|---|---|---|---|
| AMPs (continued) | | | | | |
| 347 Blue Springs | | | | 584 | |
| 348 Cerro Montoso | | | | 2,358 | |
| 349 Indian Peak | | | | 1,315 | |
| 360 Chupadera | | | | 4,382 | |
| TOTAL | 9,760 | 6,364 | 312,294 | 935,418 | 3,600 |
| | | ACRES PER VISUAL RESOURCE CLASS (Includes only Public Lands) | | | |
| Non-AMPs /2 | | | | | |
| All 26 allotments 46,142 Total Acres | | | 6,201 | 39,941 | |
| Elimination of Grazing /2 | | | | | |
| 4 allotments 1,987 Total Acres | | 109 | 751 | 1,127 | |
| Unallotted | | | | | |
| 2 allotments 2,582 Total Acres | | | 2,379 | 203 | |
| GRAND TOTAL | 9,760 | 6,773 | 321,625 | 976,689 | 3,600 |

/1 Acres per Visual Resource Management Class (by allotment) (Includes public, State, and private lands)
/2 Acres per Visual Resource Management Class (by allotment) (Includes only public lands)

Source: URA Visual Resource Classes Overlay and Allotment Maps, Socorro District

# APPENDIX 9

WILDERNESS


| | Page |
|---|---|
| Table A-41 58 Allotments in Roadless Areas | A-116 |

TABLE A-41

58 ALLOTMENTS IN ROADLESS AREAS

| Allot. Numbers | Allot. Names | Allot. Numbers | Allot. Names |
|---|---|---|---|
| 016 | Puertecito and Barranco | 121 | Rio Salado West |
| 012 | Riley Community | 059 | La Jencia |
| 086 | West Ladron | 052 | Cerro Colorado |
| 077 | Ladron Peak | 037 | Chavez Community |
| 006 | Ojo Saladito | 058 | Canon Alamito |
| 091 | Canada Colorado | 081 | Lopez Community |
| 036 | Rio Puerco | 122 | Abeytas |
| 129 | Arroyo Colorado | 090 | Petoch Wash |
| 165 | R. Lucero Ind. | 258 | Ojo de Amado |
| 318 | Pueblito Community | 006 | Veranito |
| 322 | Parida | 315 | Polvadera Community |
| 297 | Puertecito del Lemitar | 323 | Water Canyon |
| 263 | Black Mesa | 299 | Pequeno |
| 308 | Padilla Community | 268 | Torreon |
| 281 | Culbreath Ind. | 261 | Ball Ind. |
| 321 | Puertecito Gap | 250 | Milligan Gulch |
| 261 | Sheep Canyon | 279 | Silver Canyon |
| 293 | Malpais | 272 | San Pasqual |
| 285 | Sand Mountain | 256 | Llano |
| 275 | Adobe, Hansenburg, Padilla | 301 | Bennett-Wilson |
| 325 | West Williams | 289 | Jornada Community |
| 291 | Prairie Spring | 266 | Coyote Springs |
| 300 | Lucero Ind. | 254 | Bordo Atravesado |
| 260 | Sierra Larga | 271 | Mesa Redonda |
| 358 | Creel Ind. | 280 | Tecolote Draw |
| 262 | Las Canas | 264 | Armijo Community |
| 283 | Blackington Mountain | 252 | Fernandez-Maestas |
| 312 | La Arenosa | 255 | Bosquecito |
| 288 | Rio Grande | 287 | Gabaldon Ind. |

Source: BLM Socorro District Files

# APPENDIX 10

## RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY


| | Page |
|---|---|
| Relationship Between Local Short-Term Uses of Man's Environment and the Maintenance and Enhancement of Long-Term Productivity Methodology | A-117 |
| Figure A-19 Simplified Response Curve Showing Annual Production | A-118 |

# RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY METHODOLOGY

The annual rates of production under the Proposed Action and alternatives for the 20-year short-term use period is not available.

Generalizations drawn from range management literature were reworked by BLM personnel to produce an idealized response curve which is simplified as shown in Figure A-19, p. A-118. The total 20-year production was calculated using the following equation derived from the simplified curve.

$$\text{Total Production} = 20g + (.5)(5)(.8h) + (10)(.8h) + (.5)(10)(.2h)$$

$$= 20g + 11h$$

Where g = existing or short-term annual production (years 1-5)

h = long-term annual production (year 20) - existing or short-term annual production (years 1-5)

The long-term productivity is the percentage change between the long-term (20 year) production under the Proposed Action and alternatives and that of the Future Environment (which is the same as the No Action Alternative).

Annual vegetative production is expected to continue increasing after 2000 for an undetermined period. This would also affect other resources. Because the additional increase has not been calculated in this ES, it will not be used when calculating the long-term percent change in productivity. If these increases were used in the calculations, the percent change in productivity would change accordingly.

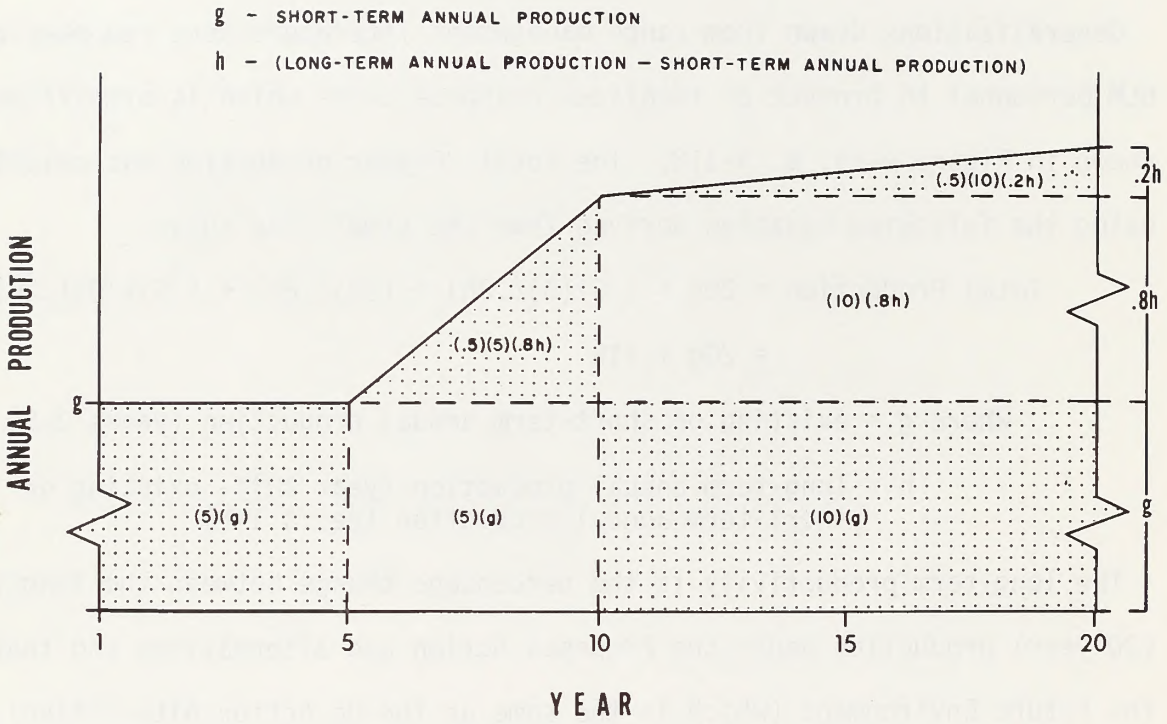



Figure A-19 Simplified Response Curve Showing Annual Production

# GLOSSARY

G

AFFINITY. The relationship of a site to past cultural group(s) eg. Anasazi, Mogollon, etc.

AGGRADATION. The filling and raising of a streambed by deposition of sediment.

AGGREGATE. Structural units of soil. They are formed by the grouping of primarily soil particles into a secondary unit.

ALLOTMENT MANAGEMENT PLANS (AMP). A concisely written program of livestock grazing management, including supportive measures, if required, designed to attain specific management goals in an allotment.

ALLUVIUM. Materials transported and redeposited by water. (2 groups) (1) Local alluvium, like that found at the base of slopes, along small streams flowing from small drainage basins of nearly homogeneous rock and soil material, and (2) general alluvium of mixed origin, as along major stream courses.

ANASAZI. The prehistoric culture located in the plateau area of the Four Corners region.

ANIMAL UNIT (AU). One cow and calf (1,000 lbs.), one horse, one elk, five sheep, five goats, five deer or five antelope or the equivalent.

ANIMAL UNIT MONTH (AUM). The amount of forage required to sustain the equivalent of one cow and calf (1,000 lbs.), one horse, one elk, five sheep, five goats, five deer or five antelope for one month.

ANION. A negatively charged ion.

ANNUALS. Plants produced from seed which complete their life cycle in one growing season.

ARCHAIC. A cultural tradition generally following the Paleo-Indian tradition. At the end of this period, maize was introduced.

ARID. Climate characterized by insufficient rainfall to support agriculture, usually less than 10 inches annually.

ARTHROPOOS. Invertebrate organisms in the phylum Arthropoda, including insects and arachnids.

ASPECT. The visual first impression of vegetation at a particular time or as seen from a specific point.

ASSOCIATION. A mapping unit used on generalized soil maps in which two or more defined taxonomic units occurring together in a characteristic pattern are combined.

AQUIFER. A water-bearing bed or stratum of permeable rock, sand, or gravel capable of yielding considerable quantities of water.

BARREN. A vegetative subtype which has little or no vegetation present.

BASALT. A dark-gray to black dense to fine grained igneous rock that consists of basic plagioclase augite; and usually magnetite with olivine for basalt glass.

BEDROCK. The solid rock underlying the soil and other unconsolidated materials or appearing at the surface where these are absent.

BOLSON. A flat-floored desert valley that drains to a playa.

BOSQUE. Dense growth of trees and underbrush, generally on the flood plain or adjacent to a stream or body of water.

BROWSE. As a verb, to consume, or feed or eat on woody plants; as a noun, the tender leaves, buds, and twigs of trees and shrubs often used as food by cattle, deer, elk, and other animals.

BROWSER. An animal that feeds on the leaves, buds, and twigs of woody plants.

CALCAREOUS SOIL. Soil containing sufficient free calcium carbonate or calcium-magnesium carbonate to effervesce visibly when treated with cold 0.1 N hydrochloric acid.

CALCIC HORIZON. A layer of secondary accumulation of carbonates, usually of $C_a$ or $M_g$ in excess of 15 percent calcium carbonate equivalent and contains at least 5 percent more carbonate than an underlying layer.

CALICHE. A layer near the surface, more or less cemented by secondary carbonates of calcium or magnesium precipitated from the soil solution. It may occur as a soft, thin soil horizon, as a hard, thick bed just beneath the solum, or as a surface layer exposed by erosion.

CARRY-OVER FORAGE. Ungrazed forage produced during the previous year.

CATION. A positively charged ion.

CFS. Cubic feet per second.

CHANNERY. In Scotland and Ireland, gravel; in the United States, thin, flat fragments of limestone, sandstone, or schist up to 6 inches in major diameter.

CLASS OF LIVESTOCK. Kinds of domestic livestock grazing on a range; cattle, horses, sheep or goats, or a combination of these. May be broken down to greater detail such as cows with calves, yearlings, steers, ewes, ewes with lambs, etc.

CLAY. A mineral soil separate consisting of particles less than 0.002 mm in equivalent diameter.

COARSE FRAGMENTS. Rock or mineral particles 2.0 mm in diameter.

COBBLES. Rounded or partially rounded rock or mineral fragments between 3 and 10 inches in diameter.

COLIFORM. A group of bacteria used as an indicator of sanitary quality in water. The total coliform group is an indicator of sanitary significance because the organisms are normally present in large numbers in the intestinal tracts of humans and other warm-blooded animals.

COMPLEX (Soil). A mapping unit in which two or more defined taxonomic units are so intimately intermixed geographically that it is undesirable or impractical, because of the scale being used, to separate them.

*COMPONENT. The distinguishable evidence of a discrete occupation or use of that site by a group of people.*

CONTINENTAL CLIMATE. The climate of areas where temperature extremes are wide because of lack of oceanic influence. Commonly occurs in the interior of large continents.

CONTRAST. The effect of a striking difference in the form, line, color, or texture of an area being viewed.

CONVECTIONAL THUNDERSTORMS. Storms that occur in the summer when the land surface becomes very hot under strong insolation and the lower strata of the atmosphere, in turn, heated considerably. Cumulus clouds are the upper ends of columns of overturned air formed by warm air projected upward to altitudes where it is chilled to the point of condensation. This phenomenon results in rains of high intensity, short duration and local distribution, usually accompanied by lightning (R. F. Daubenmire).

COOL-SEASON GRASS. A plant which makes the major portion of its growth during late winter, early spring, and again in the fall (during the cool seasons).

COVER. Small rocks, litter, basal areas of grass and forbs, and aerial coverage of shrubs that provide protection to the soil surface (i.e., in contrast to bare ground).

COVER, WILDLIFE. The plants or other objects used by animals for nesting, resting, escaping from predators or to avoid adverse environmental conditions.

COW-CALF OPERATION. A cattle business that sells weaned calves about 9 months of age.

COW-CALF-YEARLING OPERATION. A cattle business that sells weaned calves and yearlings.

CRITICAL WILDLIFE HABITAT. That portion of the living area of a wildlife species that is essential to the survival and perpetuation of the species either as individuals or as a population.

CYCLONIC OR FRONTAL STORMS. Storms that are caused by eddies of warm air several hundred miles in diameter; rising in vertical spirals above centers of low atmospheric pressure. As the ascending mass of air in a cyclone rises, it expands, mingles with cold air and, thereby, is greatly cooled. Precipitation results from this action and storms of this type are usually of long duration.

DECREASER. A plant species of the original vegetation that will decrease in relative abundance with continued overuse.

DENDRITIC. This is a stream drainage pattern where rock offers uniform resistance to weathering and erosion, thus, tributaries subdivide headward, like the limbs of a tree, with a main trunk-like stream and limb-like tributaries.

DESIRABLE PLANTS. Plants which are palatable and productive forage species, often are dominant under or near climax conditions, are long-lived, and have deep fibrous roots to protect the watershed against erosion. This category includes the important key species (grasses, forbs, and browse) which are to be maintained or increased by intensive livestock management.

DIRECT INCOME. Income that can be charged to a specific source.

DOMESTIC CONSUMPTION. Steers used for consumption.

DRAWDOWN. The distance by which the groundwater surface level is lowered by pumping from a well.

DUNELAND. Consists of ridges and the intervening troughs made up of sand-sized particles that shift with the wind. It is devoid of vegetation.

EARTHEN RESERVOIR. A man-made earthen catchment for retaining runoff water for use by livestock and wildlife.

ENDANGERED OR THREATENED STATUS. Determined for plants and animals by any one or a combination of the following factors:
1. The present or threatened destruction, modification, or curtailment of its habitat or range;
2. Overutilization for commerical, sporting, scientific, or educational purposes;
3. Disease or predation;
4. The inadequacy of existing regulatory mechanisms; or,
5. Other natural or man-made factors affecting its continued existence.

ENDANGERED SPECIES - FEDERALLY LISTED. Any species of animal or plant in danger of extinction throughout all or a significant portion of its range. This definition excludes species of insects that the Secretary of the Interior determines to be pests and whose protection under the Endangered Species Act of 1973 would present an overwhelming and overriding risk to men.

ENDANGERED SPECIES - STATE (GROUP I). Species whose prospects of survival or recruitment in the state are in jeopardy.

ENDANGERED SPECIES - STATE (GROUP II). Species whose prospects of survival or recruitment within the state may become jeopardized in the foreseeable future.

ENDEMIC. Prevalent in, or restricted to, a particular area, region, or country.

EPHEMERAL STREAM. A stream that flows only briefly during and following a period of rainfall in the immediate vicinity.

ERODIBILITY. Being susceptible to erosion. (Expressed by such terms as highly erodible, slightly erodible, etc.)

EROSION. The wearing away of the land surface by running water, wind, ice, or other geological agents including such process as gravitational creep.

EVAPOTRANSPIRATION. Loss of water from the soil both by evaporation from the surface and by transpiration from the plants growing thereon.

EXCLOSURE. An area fenced to exclude animals.

FAULT BLOCKS. A mass bounded on at least two opposite sides by faults; it may be depressed or elevated relatively to the adjoining region.

FEDERAL LAND POLICY AND MANAGEMENT ACT OF 1976. Public Law 94-579 gives the Bureau of Land Management the legal authority to establish public land policy; to establish guidelines for its administration; to provide for the management, protection, development, and enhancement of the public lands; and for other purposes.

FLATS. A stretch of level ground.

FLOOD PLAIN. A plain built up or in the process of being built up by stream deposition.

FORAGE. Plants which are used as food by large herbivores such as cattle and large and small wildlife.

FORAGE ACRE. The number of acres in a specific area (such as a pasture or an allotment) that is completely covered by forage.

FORAGE ACRE REQUIREMENT (FAR). The number or fraction of forage acres necessary to support and maintain an animal for a specified period of time.

FORB. Herbaceous plants other than grass, such as clover.

GRAZING CAPACITY. The maximum stocking rate possible without inducing damage to vegetation or related resources. It may vary from year to year in the same area because of fluctuating forage production.

GRAZING PREFERENCE. The total number of animal unit months of livestock grazing on public lands apportioned and attached to base property owned or controlled by a permittee or lessee.

GRAZING SYSTEM. A systematic sequence of grazing use and non-use of an allotment to reach identified multiple use goals or objectives by improving the quality and quantity of the vegetation.

GROUND COVER (Soil) (Hydrologic). All material which covers the ground surface; includes live vegetation, dead vegetative material (litter), and small and large rocks.

GROUND COVER (Vegetation). Living vegetation which covers a point on the ground surface, when viewed from directly overhead, including canopies of trees and shrubs within 20 feet or less of the ground surface and lichens and mosses 1/16 inch or more in thickness.

GULLY EROSION. Removal of soil whereby the formation of relatively large channels or gullies cut into the soil by concentrations of runoff.

GYPSUM. A mineral consisting of hydrous calcium sulfate.

GYPSUM LAND. Consists of exposures of nearly pure soft gypsum. The surface is usually very unstable and erodes easily. The areas lack vegetation.

HEAVY USE. The proportion of current year's forage production that is eaten or destroyed by grazing animals ranges from 60-80 percent. See Utilization.

HOME RANGE (Wild Horses). The area over which an animal or group of animals travels in pursuit of routine activity. It implies a self-imposed restriction of movement.

HYDROLOGIC SOIL GROUPS.

A. Low runoff potential - These soils have high infiltration rates even when thoroughly wetted and consist chiefly of deep, well to excessively drained sands or gravels. These soils have a high rate of water transmission.

B. Soils having moderate infiltration rates when thoroughly wetted and consisting chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures. These soils have a moderate rate of water transmission.

C. Soils having slow infiltration rates when thoroughly wetted and consisting chiefly of soils with a layer that impedes downward movement of water, or soils with moderately fine to fine textures. These soils have a slow rate of water transmission.

D. High runoff potential - Soils having very slow infiltration rates when thoroughly wetted and consisting chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a clay pan or clay layer at or near the surface, and shallow soils over nearly impervious material.

INCLUSIONS (Soil). Any soil or soil material that falls outside of the named phase or the range of the named series in the mapping unit.

INCREASERS. Plants which increase as the vegetational composition deteriorates.

INDIRECT INCOME. Income derived that cannot be charged to a specific source.

INFILTRATION. The movement of water through the soil surface into the soil.

INTERMEDIATE PLANTS. Plants of secondary importance in the climax condition. They replace the desirable plants, as condition deteriorates, and replace the least desirables as condition improves. They may be less desirable to grazing animals or be more resistant to grazing use.

INTERMITTENT STREAM. Flows at least 30 consecutive days during certain times of the year.

INTRUSION. Feature (land, vegetation, or structure) which is generally considered out of context with the characteristic landscape.

INTRUSIVES. Denoting igneous rocks in a molten state which have evaded other rock formations and cooled below the surface of the earth.

INVADERS. Plants which invade or occupy open space resulting from the loss of other longer lived plants.

JORNADA MOGOLLON. A branch of the Mogollon culture area. The Mogollon were located in southwestern New Mexico and lapped into Arizona and Mexico.

KEY AREA. A portion of range, which, because of its location, grazing or browsing value, and/or use, serves as an indicative sample of range conditions, trend or degree of use seasonally.

KEY FORAGE SPECIES. Relatively or potentially abundant, endures moderately close grazing, and serves as an indicator of changes occurring in the vegetative complex. This species is an important vegetative component that, if overused, will have significant effect on watershed condition, grazing capacity, or other resource values. Other forage species having growth requirement equal to or less than the key species will be maintained by the rest.

KEY SPECIES. Forage species whose use serves as an indicator to the degree of use of associated species.

LAMINAR FLOW. Non-turbulent flow of a fluid near a boundary.

LANDSCAPE CHARACTER. The arrangement of a particular landscape as formed by the variety and intensity of the four basic elements of form, line, color, and texture.

LIFE ZONE. A classification of flora and fauna based on elevation and latitude.

LIGHT USE. The preparation of current year's forage production that is eaten or destroyed by grazing animals ranges from 20-40 percent. See Utilization.

LIMESTONE. A sedimentary rock consisting chiefly (more than 50 percent) of calcium carbonate, primarily in the form of calcite.

LITHIC. A stone or rock exhibiting modification by humans. It generally applies to projectile points, scrapers, chips, etc., rather than ground stone.

LITTER. A surface layer of loose organic debris consisting of freshly fallen or slightly decomposed organic materials.

LIVESTOCK OPERATION. The type of cattle business such as: cow-calf operations, yearling operations, or cow-calf-yearling operations.

LIVESTOCK OPERATOR. A person who operates a livestock business.

LLANO. A large, grassy, almost treeless plain as found in Latin America or the southwestern United States.

LOAM. Soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

MAGNITUDE OF CONTRAST. A classification of intrusions as to the degree which they have modified or intruded upon the natural landscape.

MANAGEMENT FRAMEWORK PLAN (MFP). Land use plan for public lands which provides a set of goals, objectives, and constraints for a specific planning area to guide the development of detailed plans for the management of each resource.

MAPPING UNIT. One or more soil series and inclusions used to describe a soil delineation (i.e., soil associations, consociations, and complexes).

MESA. An isolated hill or mountain having abrupt or steeply sloping sides and a level top that is composed of a resistant nearly horizontal stratum of rock.

MESOZOIC. A geologic time unit from about 230 to 63 million years ago; it comes after the Paleozoic era and before the Cenozoic era.

METASEDIMENTS. Partly metamorphosed sedimentary rocks.

MODERATE USE. The proportion of current year's forage production that is eaten or destroyed by grazing animals ranges from 40-60 percent. See Utilization.

MOISTURE REGIMES. Areas with or of different soil saturation levels. Areas with different amounts of available ground water (water held at a tension of 15 bars).

NATIONAL REGISTER. The National Register of Historic Places, which is a register of districts, sites, buildings, structures, and objects significant in American history, architecture, archaeology, and culture maintained by the Secretary of the Interior.

NET RETURNS. Whatever remains from earnings and profits after all costs, expenses and allowances for depreciation have been deducted.

OFF-ROAD VEHICLE (ORV). Any motorized vehicle designed for or capable of cross-country travel on or immediately over land, water, sand, snow, ice, marsh, swampland, or other terrain.

OVERLAND FLOW. Non-channel surface runoff. Also called sheetflow. (Also, see surface runoff.)

OVERGRAZING. Consumption of vegetation by herbivores beyond the endurance of a plant to survive.

OVERSTOCKING. A condition in which an area is occupied by more than the optimum number of livestock (wildlife, trees, etc.).

OVERSTORY. The upper canopy or canopies of plants.

PACE POINT TRANSECTS. A method of estimating the vegetative ground cover which occurs on a predetermined transect line. A notch 1/8-inch wide and 1/16-inch deep is made on the sole of the toe of the boot. As that toe touches the ground, whatever is under or above the notch is recorded, i.e., live vegetation (species), litter (dead vegetative material) rock and bare ground.

PALEO-INDIAN. Cultural remains of human groups which coexisted with Pleistocene megafauna in North America.

PALEOZOIC. Geologic time unit, about 600 to 230 million years ago.

PASTURE. As used in this document, a pasture is a subdivision of a grazing allotment on public lands.

PERCOLATION. Downward movement of water through soils.

PERENNIAL PLANT. A plant that has a life cycle of 3 or more years.

PERENNIAL STREAM. A stream that flows continuously during all seasons of the year.

PERMEABILITY. The measure of the capacity for transmitting a fluid through the substance.

PETROCALCIC HORIZON. A continuous indurated calcic horizon that is cemented by calcium carbonates and, in some places, with magnesium carbonates. Cannot be penetrated with a spade, is impenetrable by roots.

PHENOLOGY. A term used to describe the sequence of events and time of occurrence of the life processes of a plant, i.e., start of growth, bloom stage, seed ripe stage, dormant stage.

PIRO. A branch of the Anasazi. These people were the first Anasazi people encountered by the Spanish conquistadores.

PLANT DENSITY. The number of vegetation individuals per unit of area. Refers to the relative closeness of individual vegetation to one another.

PLANT VIGOR. The relative well-being and health of a plant as reflected by its ability to manufacture sufficient food for growth and maintenance.

PRECAMBRIAN. That portion of geologic time before 600 million years ago.

PROCUREMENT/PROCESSING LOCI. Areas of subsistence and other resource extraction or processing activities.

PUBLIC LANDS. Lands administered by the Bureau of Land Management and owned by the public.

PUEBLO. Of, or relating to, a culture of the plateau area of the Southwestern U.S.

PROPER USE FACTOR (PUF). The average weight percentage of a particular plant specie in relation to all other species that can be safely grazed without restricting forage capacity production.

RANGE CONDITION. The present state of the plant community on a range site in relation to the potential natural plant community for that site.

RANGE CONDITION CLASS. One of a series of arbitrary categories used to classify range condition, usually expressed as either excellent, good, fair, or poor in this report.

RANGE CONDITION CLASS (continued). Four classes are used to express the degree to which the composition of the present plant community reflects that of the climax. They are:

| Range Condition Class | Percentage of present plant community that is climax for the range site |
|---|---|
| Excellent | 76-100 |
| Good | 51-75 |
| Fair | 26-50 |
| Poor | 0-25 |

RANGE SITE. A distinctive kind of rangeland that differs from other kinds of rangeland in its potential to produce native plants.

RANGE TREND. The direction of change in range condition.

RANGE TYPE. A mapping unit used in range surveys. It is a relatively homogenous classification unit on the basis of the following criteria:

abundance of vegetation
species composition
slope
exposure
kind of soil
erosion.

RECHARGE. The natural replenishment of groundwater storage by infiltration of surface water.

RECREATION RESOURCES. Any natural or cultural resource or feature that contributes to a recreation experience.

RETENTION. Having the capability or capacity to retain, as soil water in soils.

RETROGRESSION. The process whereby the same area becomes successively occupied by different plant communities of lower ecological order.

RILL EROSION. Removal of soil through the cutting of numerous small, but conspicuous water channels that are minor concentrations of runoff.

RIO GRANDE RIFT. The valley formed by down-thrown fault blocks, and filled by sediments eroded from the bordering upthrown fault blocks in which the Rio Grande flows in southern New Mexico.

RIPARIAN VEGETATION. Vegetation which occurs in or adjacent to drainage ways and/or their floodplains and which is further characterized by species and/or like forms different from that of the adjacent nonriparian vegetation.

ROADLESS AREAS. A contiguous tract of public land which is 5,000 acres or greater and is bounded by a road and/or land ownership change (non-BLM).

ROCK UNITS. Stratographic units defined and identified by lithologic or structural features without regard to fossils or time boundaries.

RUN-IN. Areas receiving moisture in addition to direct rainfall.

RUNOFF. A general term used to describe the portion of precipitation on the land that ultimately reaches streams; may include channel and non-channel flow.

SACRIFICE AREAS. Areas generally receiving 80 percent or more livestock utilization every year.

SALINITY. Saline soil, condition of - an unalkaline soil containing sufficient soluble salts to impair its productivity.

SAND. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 mm. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and less than 10 percent clay.

SANDSTONE. A sedimentary rock containing predominately sand-size clastic particles, usually consists of quartz more or less firmly united by some cement (as silica, iron oxide, or calcium carbonate) and that varies in color, being commonly red, yellow, brown, gray, or white.

SCENIC QUALITY. The degree of harmony, contrast, and variety within a landscape.

SECTION. One square mile or 640 acres.

SECTION 4 PERMIT. A permit issued by BLM for the licensee to construct a project on public lands. The project must be built to BLM specifications. The licensee has the sole interest in the project on public lands, including maintenance.

SEDIMENT. Solid, clastic material, both mineral and organic, that is in suspension, is being transported or has been moved from its site of origin by water, wind, or ice and has come to rest on earth's surface, either above or below sea level.

SEMIARID. Climate characterized by light rainfall and high evaporation, the growth of short grasses, and dry farming of limited yield; having from 10 to 20 inches of annual precipitation.

SHEET EROSION. More or less uniform removal of soil from an area without the development of conspicuous water channels.

SHEETFLOW. See Overland Flow.

SILT. Sedimentary material consisting primarily of mineral particles intermediate in size between sand and clay.

SLOUGH. To be shed or cast off.

SOIL. (i) The unconsolidated mineral material on the immediate surface of the earth that serves as a natural medium for the growth of land plants. (ii) The unconsolidated mineral matter of the surface of the earth that has been influenced by genetic and environmental factors including parent material, climate, topography, all acting over a period of time and producing soil that differs from the parent material in physical, chemical, biological, and morphological properties and characteristics.

SOIL DEPTH.

| | Lower Boundary Inches | |
|---|---|---|
| Very Shallow | Less than | 12 |
| Shallow | | 12-20 |
| Moderately Deep | | 20-36 |
| Deep | | 36-40 |
| Very Deep | More than | 40 |

SSF. The abbreviation for Soil Surface Factor. The SSF, as computed through the use of BLM Form 7310-12, is an expression of current erosion activity. Seven categories of surface features are considered by the field man in the examination of the area represented by a Transect. Both wind and water are considered for each category. The categories are: soil movement, surface litter, surface rock, pedestalling, rills, flow patterns, and gullies. Numerical values are assigned to each category and are totaled to determine the SSF. The value of the SSF determines the erosion condition class of the transect area. Also, see erosion condition.

SOIL SERIES. A group of soils having genetic horizons that, except for texture of the surface layer, have similar characteristics and arrangement in the profile.

SOIL TEXTURE. The relative proportions of the various soil separates, sand, silt, and clay.

SOLUM. The solum may be defined simply as the genetic soil developed by soil-building forces. In normal soils, the solum includes the A and B margins or the upper part of the soil profile above the parent material.

SONORAN. Relating to, or being, the arid division of the biographic zone that includes the warmer parts of the western U. S. and central Mexico.

SPRING. A flow of water from the ground; the source of a stream.

STAGE. The height of the surface of a river above an arbitrary zero point.

STORM.

2-Year Storm. Volume and intensity of a storm that could be expected to happen once in 2 years.

5-Year Storm. Volume and intensity of a storm that could be expected to happen once in 5 years.

10-Year Storm. Volume and intensity of a storm that could be expected to happen once in 10 years.

25-Year Storm. Volume and intensity of a storm that could be expected to happen once in 25 years.

SUBSOIL. Refers to the B horizon of soil with distinct profiles. In soils with weak profile development, subsoil can be defined as the soil below the surface soil in which roots normally grow or in terms of arbitrary depths.

SUBSTRATUM. Is on layer beneath the solum, either conforming (C) or unconforming (D).

SURFACE RUNOFF. Water that travels over the ground surface to a channel.

SWALE. A tract of low and sometimes wet land.

TALUS SLOPES. Slopes formed by the accumulation of rock debris.

TERM PERMITS. An authorization for livestock grazing of public lands, and other lands under BLM control, for a certain length of time (not to exceed 10 years).

TERRITORIES (Primary Wild Horse Use Areas). An area with a high concentration of horse activity which is clearly marked with scent or visual markings (stud piles) to deter other males from encroachment.

TERTIARY. Of, or relating to, the time interval between the close of the Mesozoic era and the beginning of the Quaternary period from about 63 to 2 million years ago.

TEXTURE (Soils). The relative proportions of various soil separates, sand, silt, and clay.

THREATENED SPECIES. Any species likely to become endangered within the foreseeable future throughout all or a significant part of its range.

TILTH. The physical condition of soil as related to its ease of tillage, fitness, as a seedbed and its impedance to seedling emergence and root penetration.

TRANSITION ZONE. The life zone which extends from about 7,000 to 9,500 feet elevation. The major flora characterizing life zone is ponderosa pine.

UNDERFLOW. An underground stream or movement of water.

UNDERSTORY. The plants growing beneath the canopy of other plants.

UNIT HYDROGRAPH. A graph of streamflow versus runoff for a 1-inch storm of a given duration.

UPPER SONORAN LIFE ZONE. The life zone which extends from about 4,500 to 8,000 feet elevation. The major flora characteristic of this life zone is pinyon-juniper.

UTILIZATION. The proportion of current years' forage production that is eaten or destroyed by grazing animals, usually expressed as a percentage. In this report:

| | | |
|---|---|---|
| Sacrifice | = 80-100 | percent |
| Heavy | = 60-80 | percent |
| Moderate | = 40-60 | percent |
| Light | = 20-40 | percent |
| Slight | = 0-20 | percent |

VEGETATION TYPE. A plant community with distinguishable characteristics.

VEGETATIVE COMPOSITION. Percentage of vegetation occupied by each species.

VEGETATIVE SUBTYPE. A subdivision of a vegetative type which generally indicates an aspect to the viewer of either a single dominant species, or dominant species, similar in appearance (i.e., vegetative type = conifer; vegetative subtype = ponderosa pine; vegetative type = grass; vegetative subtypes = shortgrass, tallgrass, etc.).

VIEWING DISTANCE. The distance between the viewer and the resource being viewed as used in BLM's Visual Resource Management System. Distances are defined as visual zones: a. Foreground - Middle Ground - 3 to 5 miles. b. Background-5 miles to loss of resource visibility in the distance. c. Seldom Seen - Resource which cannot be seen from viewpoint.

VIGOR (Plants). The state of health of a plant. The capacity of a plant to respond to growing conditions, to make and store food, produce food, produce seed, or reproduce vegetatively, that is, by stolons or rhizomes.

VISUAL RESOURCE. The land, water, vegetative, animal, and other features that are visible on all public lands.

VISUAL SENSITIVITY. An index of the relative importance of value of visual response to an area in relation to other areas in the planning unit.

VISUAL ZONES. The area that can be seen as foreground, middleground, background, or seldom seen.

VOLCANIC FLOWS. Material ejected, in various forms, during volcanic activity which leaves deposits after flowing in horizontal, or near horizontal beds.

VOLCANIC PLUG. The solidified material (basalt) filling a vent or pipe of a dead volcano.

WARM SEASON GRASS. A plant which makes most, or all of its growth during the spring, summer or fall and is usually dormant in winter; grows during the warm seasons.

WELL. A deep hole or shaft sunk into the earth to tap an underground supply of water, gas, oil, etc.

WIND ERODIBILITY GROUP (WEG). A group of soils having the same potential for soil blowing.

XERIC. A soil moisture regime common to Mediterranean climates that have moist-cool winters and warm-dry summers.

YEARLING OPERATION. A cattle business that sells cattle at the age of 18 to 24 months old.

# REFERENCES

R

American Geological Institute. 1962. Dictionary of Geological Terms. Dolphin Books. Doubleday & Company, Inc. Garden City, New York. p. 554.

Anderson, E. W. 1967. Rotation of Deferred Grazing. Society of Range Management. 20:5-7.

Bailey, Vernon. 1971. Mammals of the Southwestern United States with Special Reference to New Mexico. Dover Publications. New York. 412 p.

Beale, Donald M. and Smith, Arthur D. 1970. "Forage Use, Water Consumption, and Productivity of Pronghorn Antelope in Western Utah." Journal of Wildlife Management. 34(3):570-582.

Berghofer, Louis. 1967. "Predators," New Mexico Wildlife Management. State of New Mexico Department of Game and Fish. Santa Fe. pp. 195-199.

Biswell, H. H. 1951. "Studies of Rotation Grazing in the Southeast." Journal of Range Management. 4:53-55.

Black, W. H. and Clark, V. 1. 1942. Yearlong Grazing of Steers in the Northern Great Plains. U. S. Department of Agriculture Circular 642. 16 p.

Boeker, E. L.; Scott, V. E.; Reynolds, H. G.; Donaldson, B. A. 1972. "Seasonal Food Habits of Mule Deer in SW NM." Journal of Wildlife Management. 36(1):56-63.

Bolton, Herbert E. 1949. Coronado Knight of Pueblos and Plains. University of New Mexico Press. Albuquerque.

Bureau of Economic Research. 1975. New Mexico Statistical Abstract 1975. University of New Mexico. Albuquerque.

Bushman, F. X. 1963. Groundwater in Socorro Valley. In: Guidebook of the Socorro Region, edited by Fredrick Kuellmer. Fourteenth field conference. New Mexico Geological Survey. Socorro, New Mexico. pp. 155-159.

Buttery, Robert F. and Shields, Paul W. 1975. "Range Management Practices and Bird Habitat Values," Symposium on Management of Forest and Range Habitats for Nongame Birds. Tucson. May 6-9.

Campbell, John Martin and Ellis, Florence Hawley. 1952. "The Atrisco Sites: Cochise Manifestations in the Middle Rio Grande Valley," American Antiquity. Salt Lake City. Vol. 17. No. 3. pp. 211-221.

Campbell, H. 1960. "An Evaluation of Gallinaceous Guzzlers for Quail in New Mexico," Journal of Wildlife Management. 24:21-26.

Campbell, Howard; Martin, Donald; Ferkovich, Paul; and Harris, Bruce. 1973. "Effects of Hunting and Some Other Environmental Factors on Scaled Quail in New Mexico," Wildlife Monograph No. 34. The Wildlife Society. Washington.

Campbell, R. S. 1929. Vegetative Succession in the Prospis Sand Dunes of Southern New Mexico. Ecology 10. 392-398.

Canfield, R. H. 1948. "Perennial Grass Composition as an Indicator of Condition of Southwestern Mixed Grass Ranges." Ecology. 29:190-204.

Carothers, Steven W. 1977. Importance, Preservation and Management of Riparian Habitat: An Overview. Importance, Preservation and Management of Riparian Habitat: A Symposium. USDA Forest Service. Tucson, Arizona.

Carothers, Steven W. and Johnson, R. Roy. 1971. A Summary of the Verde Valley Breeding Bird Survey. 1970. Arizona Game and Fish Department Project FW-16-10, J8. pp. 45-64.

Clements, F. E. 1920. Plant Indicators. Carnegie Institute. Washington D. C. Pub. 290.

Cook, C. W. and Stoddart, L. A. 1963. The Effect of Intensity and Season of Use on the Vigor of Desert Range Plants. Society of Range Management. 16:315-317.

Cook, C. Wayne. 1966. Carbohydrate Reserves in Plants. Utah Agricultural Experimental Station Resource Service 31. 47 p.

Day, A. Grove. 1940. Coronado's Quest, The Discovery of the Southwestern States. University of California Press. Berkeley and Los Angeles.

Devlin, Robert M. 1966. Plant Physiology. Reinhold Publishing Corporation. p. 564.

Dick, H. W. 1965. Bat Cave. School of American Research. Monograph No. 27. Santa Fe.

Dillion, Claude C. 1958. Benefits of Rotation-Deferred Grazing on Northwest Ranges. Society of Range Management. 278-281, 4 p.

Dobie, J. Frank. 1952. The Mustangs. Little Brown. Boston. 376 p.

Dodd, Jerry. 1977. Personal Communication. "Blue Grama Ranges at the Pawnee Do not Change in Plant Composition as Utilization Increases."

Driscoll, R. S. 1967. Managing Public Rangelands: Effective Livestock Grazing Practices and Systems for National Forest and National Grasslands. U. S. Department of Agriculture AIB 315. 30 p.

Dusek, G. L. 1975. "Range Relations of Mule Deer and Cattle and Prairie Habitat." Journal of Wildlife Management. 39(3):605-616.

Duvall, V. L. and Linnartz, M. E. 1967. "Influences of Grazing and Fire on Vegetation and Soil of Longleaf Pine-Bluestem Range." Journal of Range Management. 20(4):241-247.

Environmental Protection Agency National Interim Primary Drinking Water Regulations, July 9, 1976 (41 FR 2B4D2), 40 CFR 141.

Federal Land Policy and Management Act of 1976. October 21, 1976. Public Law 94-579. 94th Congress.

Flaxman, E. 1972. Predicting Sediment Yield in Western United States. Journal of the Hydraulic Division. American Society of Civil Engineers. pp. 2D73-20B5.

_____. 1974. Progress Report on: Development of Sediment Yield Predictive Equations. 14 p.

Fletcher, J. E.; Huber, A. L.; Haws, F. W.; and Clyde, C. G. 1976. Runoff Estimates for Small Rural Watersheds and Development of a Sound Design Method. Volume 2: Design Manual. Utah Water Research Laboratory, Utah State University. Logan, Utah. 39 p.

Gardner, J. L. 1951. Vegetation of the Creosote Bush Area of the Rio Grande Valley in New Mexico. Ecological Monograph. 21:279-403.

Garrison, G. A. 1953. Effects of Clipping on Some Range Shrubs. Society of Range Management. 6:309-317.

Gifford, G. F. and Hawkins, R. H. 1976. Grazing Systems and Watershed Management: A look at the Record. Journal of Soil and Water Conservation. 7515 Northeast Ankeny Road, Ankeny, Iowa 50D21.

Gifford, G. F.; Hawkins, R. H.; and Williams, J. S. 1975. Hydrologic Impacts of Livestock Grazing on Natural Resource Lands in the San Luis Valley. Utah State University Foundation. Logan, Utah. 370 p.

Hansen, R. M. and Reid, L. D. 1975. "Diet Overlap of Deer, Elk, and Cattle in Southern Colorado." Journal of Range Management. 28(1):43-47.

Hanson, Clayton L.; Kuhlman, Armine R.; Erickson, Carl J.; and Lewis, James K. 1970. "Grazing Effects on Runoff and Vegetation on Western South Dakota Rangeland." Journal of Range Management. 23:41B-420.

Hanson, H. C.; Love, L. D.; and Morris, M. S. 1931. Effects of Different Systems of Grazing by Cattle Upon a Western Wheatgrass Type of Range Near Fort Collins, Colorado. Bulletin 377. Colorado Agricultural Experimental Station. 82 p.

Hastings, James Rodney, and Turner, Raymond M. 1965. The Changing Mile. An Ecological Study of Vegetation Change with Time in the Lower Mile of an Arid and Semiarid Region. The University of Arizona Press. Tucson, Arizona. 317 p.

Hazel, Don B. 1968. Effects of Grazing Intensity on Plant Composition, Vigor, and Production. Society of Range Management. 20:249-252.

Heady, Harold. 1961. Continuous Versus Specialized Grazing Systems: A Review and Application to the California Annual Type. Society of Range Management. 14:182-193.

Heady, H. F. 1975. Rangeland Management. McGraw-Hill Book Company. 460 p.

Herbel, C. H.; Steger, R.; and Gould, W. L. 1974. Managing Semidesert Ranges of the Southwest. New Mexico State University. Circular 456. 4B pp.

Hormay, A. L. 1955. The Harvey Valley Demonstration Allotment. USDA, F. S., Calif. Forest and Range Experimental Station. 12 p.

Horton, Jerome S. and Campbell, C. J. 1974. Management of Phreatophyte and Riparian Vegetation for Maximum Multiple-Use Values. U. S. Forest Service Res. Paper RM-117. 23 p.

Houghton, F. E. 1972. The Climate of Socorro County. In: Soil Association and Land Classification for Irrigation, Socorro County. Agricultural Experiment Station, New Mexico State Univ. Las Cruces, New Mexico. pp. 7-9.

Howard, Richard P. and Wolfe, Michael L. 1976. "Range Improvement Practices and Ferruginous Hawks." Journal of Range Management. 29(1):33-37.

Hubbard, W. A. 1951. Rotational Grazing Studies in Western Canada. Society of Range Management. 4:25-29.

Huey, William S. 1967. "Migratory Game Birds," New Mexico Wildlife Management. State of New Mexico Department of Game and Fish. Santa Fe. pp. 153-164.

Hundertmark, C. A. 1973. Preliminary Report: Elephant Butte Marsh Bird Survey June, 197D-January, 1973. 40 p.

_____. 1975. "Breeding Birds on Elephant Butte Marsh." 1975 Survey Report. State of New Mexico Department of Game and Fish. Santa Fe. 43 p.

Irwin-Williams, Cynthia. 1973. The Dshara Tradition. Origins of Anasazi Culture. Eastern New Mexico University Contributions in Anthropology. Vol. 5, No. 1. Portales.

Jahn, Lawrence R. and Trefethen, James B. 1972. Placing Channel Modifications in Perspective. In Watersheds in Transition, Proc. of a Symposium Sponsored by American Water Resource Association and Colorado State University. Fort Collins, Colorado. pp. 15-21.

Jameson, Donald A. 1970. Juniper Root Competition Reduces Basal Area of Blue Grama. Society of Range Management. 23:217-218.

Johnson, Leslie E.; Albee, Leslie R.; Smith, R. O.; and Moxon, Alvin L. 1951. Cows, Calves, and Grass. Agricultural Experiment Station South Oakota State College. Bulletin 412. 39 p.

Johnson, W. M. 1965. Rotation, Rest-Rotation, and Season-Long Grazing on a Mountain Range in Wyoming. Res. Paper RM 14. USOA, For. Ser. 16 p.

Judge, James W. 1973. Paleo Indian Occupation of the Central Rio Grande Valley in New Mexico. University of New Mexico Press. Albuquerque.

Julander, Odell. 1953. "Deer and Livestock Competition in Utah." Western Association, State Game and Fish Commission, 32nd Annual Conference Proceedings. pp. 79-85.

Kantz, K.; O'Hearn, J.; and Schaeffer, J. 1977. Final Report on: Climatological and Hydrological Conditions in East Side Socorro Study Area. BLM Contract Report YA-512-CT7-53. Ecology Consultants, Inc. 140 p.

Kidder, Alfred Vincent. 1924. An Introduction to the Study of Southwestern Archaeology. Yale University Press. New Haven.

Klipple, G. E. and Bement, R. E. 1961. Light Grazing; Is It Economically Feasible as a Range-Improvement Practice. Society of Range Management. 14:57-62.

Klipple, G. E. and Costello, Oavid F. 1960. Vegetation and Cattle Responses to Oifferent Intensities of Grazing on Short-Grass Ranges on the Central Great Plains. USOA Technical Bulletin No. 1216.

Koford, Carl B. 1958. "Prairie Dogs, Whitefaces and Blue Grama," Wildlife Monograph No.3. The Wildlife Society. Washington.

Launchbaugh, J. L. 1957. The Effect of Stocking Rate on Cattle Gains and on Native Shortgrass Vegetation in West-Central Kansas. Kansas Agricultural Experimental Station.

Lewis, James K.; Van Dyne, George M.; Albee, Leslie R.; and Whetzal, Frank W. 1956. Intensity of Grazing. Agricultural Experiment Station South Oakota State College. Bulletin 459. 44 p.

Ligon, J. Stokley. 1961. New Mexico Birds and Where to Find Them. The University of New Mexico Press. Albuquerque. 360 p.

Lowe, Charles H. 1964. Arizona's Natural Environment, Landscapes, and Habitats. University of Arizona Press. Tucson, Arizona. 136 p.

Maloiy, GMO. 1974. Water Metabolism of East African Ruminants in Arid and Semi-Arid Regions. Z. Tierz Zuechtungsbiol 90(3):219-228.

Marquis, R. and Lang, R. 1969. "Vegetational Composition and Ground Cover of Two Natural Relict Areas and Their Associated Grazed Areas in the Red Desert of Wyoming." Journal of Range Management. 12(3)104-109.

Marshall, Michael P. 1973. Background Information on the Jornada Culture Area, 1973 Survey of the Tularosa Basin. Human Systems Research, Inc. Three Rivers, New Mexico.

Martin, Clark. 1970. Vegetation Changes on Semi-Desert Ranges During 10 Years of Summer, Winter, and Year-long Grazing by Cattle. Int. Grassl. Congr. Proc. 11:23-26.

Martin, S. C. 1966. The Santa Rita Experimental Range. Res. Paper. RM-22. USOA, Forest Service. 24 p.

Martin, S. Clark. 1973. Responses of Semi-Desert Grasses to Seasonal Rest. Society of Range Management. 26:165-170.

Martin, S. Clark and Ward, Donald E. 1970. Rotating Access to Water to Improve Semi-Oesert Ranges Near Water. Society of Range Management. 23:22-26.

McKnight, T. 1959. The Wild Horse Today. Desert. 22(6):7.

McMahan, Wm. Personal Communication. Las Cruces, New Mexico. July 11, 1977.

Mera, H. P. Population Changes in the Rio Grande Glaze-Paint Area. Laboratory of Anthropology Technical Bulletin No. 9. Santa Fe, New Mexico. 1940.

Monson, Gale and Kessler, W. 1940. "Life History Notes on the Banner-Tailed Kangaroo Rats, Merriam's Kangaroo Rat and the White-Throated Woodrat in Arizona and New Mexico." Journal of Wildlife Management. 4(1):37-43.

Morris, M. G. 1967. "Responses of Some Phytophgus Insects to Cessation of Grazing," Journal of Applied Ecology. 4:459-474.

National Academy of Sciences and National Academy of Engineering. 1972. Recommend criterion by panel on public water supplies.

New Mexico Employment Security Commission. 1978. Personal Communication.

New Mexico Geological Survey. 1955. Guidebook of Southcentral New Mexico Edited by J. Paul Fitzsimmons. Sixth field conference. Roswell, New Mexico. 193 p.

_____. 1963. Guidebook of the Socorro Region, New Mexico. Edited by Frederick Kuellmer. Fourteenth field conference. Socorro, New Mexico. 240 p.

New Mexico State Engineer's Office. 1967. Water Resources of New Mexico: Occurrence, Development, and Use. State Planning Office. Santa Fe. 321 p.

New Mexico State Engineer's Office and New Mexico Interstate Stream Commission. 1974. Socorro County: Water Resources Assessment for Planning Purposes. Santa Fe. 28 p.

New Mexico State Game Commission. 1976. "Protection of Endangered Species and Subspecies of New Mexico." State of New Mexico Department of Game and Fish. Santa Fe. Regulation No. 563.

New Mexico State Heritage Program. 1977. Correspondence to Socorro District Office, July 27, 1977. Four species they felt were endemic and might occur in the ES Area. *Tradescantia ladronensis*, *Amsonia* spp., *Lesquerella praecos*, *Thelypodium vernale*.

New Mexico State University. 1976. East Socorro ES Area Cultural Resource Survey. An unpublished report prepared under contract to BLM. Las Cruces.

_____. 1977. Strawberry Peak Geothermal Cultural Resources Survey. An unpublished report prepared under contract to BLM. Las Cruces.

New Mexico Water Quality Control Commission. 1975. Water Quality in New Mexico. Albuquerque. 59 p.

_____. Water Quality Standards for Interstate and Intrastate Streams in New Mexico. Adopted August 22, 1973; revised September 29, 1975, January 13, 1976, and February 8, 1977.

Olin, George. 1975. Mammals of the Southwest Deserts. Southwest Parks and Monument Association. p. XII.

Owensby, Clenton E.; Smith, E. F.; and Anderson, Kling L. 1974. "Deferred-Rotation Grazing With Steers in the Kansas Flint Hills." Journal of Range Management. 26:393-395.

Pacific Southwest Inter-Agency Committee (PSIAC). 1968. Report on Factors Affecting Sediment Yield in the Pacific Southwest Area and Selection and Evaluation of Measures for Reduction of Erosion and Sediment Yield.

Paulsen, H. A. and Ares, F. N. 1961. Trends in Carrying Capacity and Vegetation on an Arid Southwestern Range. Society of Range Management. 14:78-83.

Pepper, J. H. 1955. "The Ecological Approach to Management of Insect Populations." Journal of Economic Entomology. 48:451-456.

Peterson, R. A. 1962. Factors Affecting Resistance to Heavy Grazing in Needle and Thread Grass. Society of Range Management. 15:183-189.

Pieper, R. D. 1968. "Comparison of Vegetation on Grazed and Ungrazed Pinyon-Juniper Grassland Sites in South Central New Mexico." Journal of Range Management. 21(1):51-53.

Pieper, Rex D. and Herbal, Carlton H. 1977. In Review. Herbage Dynamics and Primary Productivity of a Desert Grassland Ecosystem. Being reviewed by Ecology Journal. (See letter from Jerry Schickadance to John Lacey B/5/77).

Pieper, Rex D.; Rea, Kenneth H.; and Fraser, Joseph G. 1974. Ecological Characteristics of Walkingstick Cholla. Bulletin 623. New Mexico State University. p. 20.

Pond, F. W. 1957. Vigor of Idaho Fescue in Relation to Different Grazing Intensities. Society of Range Management. 13:28-30.

Pond, W. Floyd. 1961. "Effect of Three Intensities of Clipping on the Density and Production of Meadow Vegetation." Journal of Range Management. 17:34-38.

Potter, L. D., and Krenetsky, J. C. 1967. "Plant Succession with Released Grazing on New Mexico Rangelands." Journal of Range Management. 20(3):145-151.

Reardon, P. O. and Merrill, L. B. 1976. Vegetative Response Under Various Grazing Management Systems in the Edwards Plateau of Texas. Society of Range Management. 29:195-198.

Romero, P. and Wilkining, M. H. 1976. Summer Precipitation Network, Socorro County, New Mexico 1966 to 1975. New Mexico Institute of Mining and Technology, Socorro, New Mexico. 5 p.

Russell, T. Paul. 1964. Antelope of New Mexico. State of New Mexico Department of Game and Fish. Santa Fe. 103 p.

Schemnitz, Sanford D. 1961. "Ecology of the Scaled Quail in the Oklahoma Panhandle." Wildlife Society Monographs No. 8. The Wildlife Society. Washington.

Schmutz, Ervin. 1973. A Deferred-Rotation Grazing System for Southwestern Ranges. Progressive Agriculture in Arizona. 25(2):12-13.

Schmutz, Ervin M.; Michaels, C. C.; and Judd, B. I. 1967. "Boysag Point: A Relict Area on the North Rim of Grand Canyon in Arizona." Journal of Range Management. 20(6):363-369.

Scholes, France V. "Some Aspects of the Jumano Problem." Contributions to American Anthropology and History, No. 34, Vol VI. Carnegie Institution of Washington, D.C. Publication 523, 1940.

School of American Research. 1976. Summary of Known Cultural Resources in the Socorro BLM District. An unpublished report prepared under contract to BLM. Santa Fe.

Shiflet and Heady. 1971. Specialized Grazing Systems: Their Place in Range Management. USDA, SCS, SCS-TP-152. 13 p.

Shreve, F. 1917. A Map of the Vegetation of the United States. Geological Review. 3:119-125.

Sloan, Harold S. and Zurcher, Arnold J. 1970. Dictionary of Economics. Barner and Noble, Inc.

Smith, Dwight R. 1967. "Effects of Cattle Grazing on a Ponderosa Pine - Bunchgrass Range in Colorado." Technical Bulletin No. 1371. Rocky Mountain Forest and Range Experiment Station. Fort Collins, Colo. 60 p.

Smoliak, S. 1960. "Effects of Deferred-Rotation and Continuous Grazing on Yearling Steer Gains and Shortgrass Prairie Vegetation of Southeastern Alberta." Journal of Range Management. 16:239-243.

Smoliak, S.; Dormaar, J. F.; and Johnston, A. 1972. Long-Term Grazing Effects on *Stipa-Bouteloua* Prairie Soils. Society of Range Management. 25:246-250.

Society of Range Management. 1964. A Glossary of Terms Used in Range Management. Society of Range Management. 2760 W. Fifth Avenue, Denver, Colorado 80204. 32 p.

_____. 1974. A Glossary of Terms Used in Range Management. Society of Range Management. 36 p.

Soil Conservation Society. 1976. Resource Conservation Glossary. Soil Conservation Society of America. 63 p.

Southwest Research and Development Co. 1977. Socio-Economic Alternatives in the East Socorro District Environmental Statement Area and Potential Social and Economic Impacts of the Proposed BLM Grazing Program in the East Socorro Grazing Area. BLM Report. Contract No. YA-512-CT7- 1 and 3.

Spellenberg, Richard. 1977. Final Report on the Survey for Threatened and Endangered Plant Species on the East Side Socorro Area, Central New Mexico, 1976-1977. BLM Report. Contract No. YA-512-CT6-198.

Sperry, O. E.; Dollahite, J. W.; Hoffman, G. O.; and Camp, B. J. Date Unknown. Texas Plants Poisonous to Livestock B-1028. Extension Service. College Station, Texas. 57 p.

Spiegel, Zane. 1955. Geology and Groundwater Resources of Northeastern Socorro County, New Mexico. Groundwater Report 4. State Bureau of Mines and Mineral Resources and New Mexico Institute of Mining and Technology. Socorro, New Mexico. 99 p.

State of New Mexico. Department of Game and Fish. 1975. Preliminary List of Endangered Species of New Mexico. Santa Fe.

_____. Department of Game and Fish. 1975. Performance Report. W-93-R-18.

_____. Department of Game and Fish. 1977. Planning Data. (unpublished). Estimates on big game populations over the last five years. Santa Fe.

_____. State Planning Office. 1976. The New Mexico State Comprehensive Outdoor Recreation Plan. Santa Fe.

Stoddart, L. A.; Smith, A. D.; and Box, T. W. 1975. Range Management. McGraw-Hill Book Company. 532 p.

Sutcliff, D. H. 1972. Post Release Investigations of Iranian Ibex in New Mexico and Evaluations of a Proposed Release Site. M. S. Thesis. New Mexico State University. Las Cruces, New Mexico.

Swank, Wendell G. 1965. The Mule Deer in Arizona Chaparral. Arizona Game and Fish Department. Phoenix.

Texas Tech University. 1976. Range Plant and Range Ecosystem Studies Applicable to the Rio Puerco Area, New Mexico. A report by the Range Management Personnel at Texas Tech University, under contract to BLM. Albuquerque.

Thies, C. V. and Taylor, C. G. 1939. Groundwater Conditions in the Middle Rio Grande Valley, New Mexico. 12th and 13th biennial reports. State Engineer's Office. Albuquerque. pp. 268-269.

Thomas, Gerald W. 1973. Livestock Grazing on Public Lands: Unity for Political, Economic, and Ecological Reasons. Paper presented to the 26th Annual Meeting, Society for Range Management. Boise, Idaho. 12 p.

Thompson, Stanley J. 1968. Comments by the Department of Fish and Game Regarding Fish and Wildlife Resources and Phreatophytes. In: Pacific Southwest Interagency Committee, Phreatophyte Subcommittee Meetings. Vol. 3, January, 1967-December, 1970. pp. 103-111.

Titus, Frank B. 1963. Geology and Groundwater Conditions in Eastern Valencia County, New Mexico. Groundwater Report 7. State Bureau of Mines and Mineral Resources and New Mexico Institute of Mining and Technology. Socorro, New Mexico. 113 p.

Tomanek, G. W. and Albertson, F. W. 1951. "Some Effects of Different Intensities of Grazing on Mixed Prairies Near Hays, Kansas." Journal of Range Management. 4:299-306.

Tuan, Y. F. and Everard, C. E. 1973. The Climate of New Mexico. State Planning Office. Santa Fe, New Mexico. 197 p.

Turner, George T. 1971. "Soil and Grazing Influences on a Salt-Desert Shrub Range in Western Colorado." Journal of Range Management. 24:31-37.

U. S. Army Corps of Engineers. 1972. Report on Review Survey for Flood Control and Allied Purposes - Rio Puerco and Rio Salado, New Mexico. U. S. Army Engineer District, Albuquerque. pp. discontinuous.

U. S. Department of Agriculture. Forest Service. 1974. Field Guide to Native Vegetation of the Southwestern Region. 65 p.

_____. Soil Conservation Service. 1952. Soil Survey Manual. Washington, D. C. Soil Survey Staff. Agriculture Handbook 18. 503 p.

_____. Soil Conservation Service. 1962. Range Site Technical Descriptions and Range Condition Guides. Albuquerque.

_____. Soil Conservation Service. 1965. Land Resource Regions and Major Land Resource Areas of the United States. USDA Agricultural Handbook 296. 82 p.

_____. Soil Conservation Service. 1965. Land Resource Regions and Major Land Resource Areas of the United States. Washington, D. C.: U. S. Government Printing Office. 82 p.

_____. Soil Conservation Service. 1972. National Engineering Handbook, Section 4, Hydrology. U. S. Government Printing Office. Washington, D. C.

_____. Soil Conservation Service. 1975. Conservation Agronomy Technical Note 27. Wind Erosion Equation.

_____. Soil Conservation Service. 1975. Soil Taxonomy - A Basic System of Soil Classification for Making and Interpreting Soil Surveys. Agriculture Handbook No. 436. p. 754.

_____. Soil Conservation Service. 1976. National Range Handbook.

U. S. Department of the Interior. Bureau of Land Management. 1975. Environmental Analysis Record for Proposed Release of Siberian Ibex Ladron Mountain, Socorro County, New Mexico. Socorro District Office, BLM, Socorro, New Mexico. 127 p.

_____. Bureau of Land Management. 1975. BLM Manual 6300. Visual Resource Management. Socorro District Office, BLM, Socorro, New Mexico.

_____. Bureau of Land Management. 1975. BLM Manual 6320. Visual Resource Contrast Rating. Socorro District Office, BLM, Socorro, New Mexico.

_____. Bureau of Land Management. 1975. Stallion Planning Unit. Unit Resource Analysis and Management Framework Plan. (Recreation). Socorro District Office, BLM, Socorro, New Mexico.

_____. Bureau of Land Management. 1976. Ladron Planning Area Analysis. Socorro District Office, BLM, Socorro, New Mexico.

_____. Bureau of Land Management. 1976. Ladron Planning Unit. Unit Resource Analysis and Management Framework Plan (Recreation). Socorro District Office, BLM, Socorro, New Mexico.

_____. Bureau of Land Management. 1976. Stallion Planning Area Analysis. Socorro District Office, BLM, Socorro, New Mexico

_____. Bureau of Land Management. 1977. Environmental Assessment Record and Technical Examination on Proposed Geothermal Leasing in the Socorro Peak Area. 1977. Socorro District Office, BLM, Socorro, New Mexico. pp. 11-51, 11-62, 111-20, and 111-30.

_____. Bureau of Land Management. 1977. Public Land Facts - New Mexico, Oklahoma, and Texas. New Mexico State Office. P. O. Box 1449, Santa Fe. 28 p.

_____. Bureau of Land Management. 1976. Public Land Statistics. U. S. Government Printing Office: 0-228-461. 186 p.

_____. Bureau of Land Management. Thursday. July 14, 1977. "Endangered and Threatened Wildlife and Plants." Federal Register. Vol. 42, No. 135:Part V.

_____. Fish and Wildlife Service. 1973. Threatened Wildlife of the United States. Fish and Wildlife Service. 289 p.

U. S. Department of Commerce. National Oceanic and Atmospheric Administration, National Weather Service. 1973. Precipitation-Frequency Atlas of the Western United States. NOAA Atlas 2. Silver Springs, Maryland. 43 p.

_____. Bureau of Census. 1975. Population Estimates and Projections. U. S. Government Printing Office. Washington, D. C.

_____. Weather Bureau. 1965. Climatography of the United States. No. 86-25, New Mexico. U. S. Government Printing Office. Washington, D. C. 95 p.

U. S. Geological Survey. 1947-1965. Water Supply Papers: Water Resources of the Rio Grande Basin. U. S. Government Printing Office. Washington, D. C.

_____. 1956-1976. Water Resource Data for New Mexico. U. S. Geological Survey Water-Data Reports NM-56-1 through NM-76-1. Albuquerque.

U. S. Water Resources Council. 1976. Guidelines for Determining Flood Flow Frequency. Bulletin 17 of the Hydrology Committee. Washington, D. C.

Urness, Philip J.; Green, Win; and Watkins, Ross K. 1971. "Nutrient Intake of Deer in Arizona Chaparral and Desert Habitat." Journal of Wildlife Management. 35(30):469-475.

Valentine, K. A. 1970. Influence of Grazing Intensity on Improvement of Deteriorated Black Grama Range. New Mexico State University. Bulletin 553. 21 p.

Valentine, K. A. and Gerard, J. B. 1968. Life-History Characteristics of the Creosote Bush, *Larrea tridentata*. Bulletin 526. New Mexico State University. 32 p.

Vivian, Gordon. 1964. Excavations in a 17th Century Jumano Pueblo: Gran Quivira. Archeological Research Series, No. 8. National Park Service. Washington, D. C.

Wiens, John A. and Dyer, Melvin I. 1975. "Rangeland Ari Faunas: Their Composition, Energetics, and Role in the Ecosystem." Symposium on Management of Forest and Range Habitats for Nongame Birds. Tucson. May 6-9.

Wilderness Act of 1964. Public Law 88-577. U. S. Government Printing Office, Washington, D. C.

Wischmeier, W. H. and Smith, D. O. 1965. "Predicting Rainfall - Erosion Losses from Cropland East of the Rocky Mountains." U. S. Department of Agriculture. Handbook 282.

Wood, John E. 1969. Rodent Populations and Their Impacts on Desert Rangelands. Agricultural Experiment Station, Bulletin 555. New Mexico State University. Las Cruces.

Wood, John E.; Brikle, Thomas; Evans, Wainright; Germany, James C.; and Volney, W. Howard Jr. 1970. The Fort Stanton Mule Deer Herd. New Mexico State University Agricultural Experiment Station. Bulletin No. 567. 32 p.

Woolfolk, E. J. 1960. Rest-Rotation Management Minimizes Effects of Drought, Res. Note 144. USDA, Pacific Southwest, Forest and Range Experimental Station. 3 p.

Wormington, H. M. 1947. Prehistoric Indians of the Southwest. Denver Museum of Natural History. Popular Series No. 7. Denver.

_____. 1957. Ancient Man in North America. Denver Museum of Natural History. Popular Series No. 4. Denver.

Yoakum, Jim and Dasmann, W. P. 1969. "Habitat Manipulation Practices, Wildlife Management Techniques." The Wildlife Society. Washington.

York, John C. and Dick-Peddie, William A. 1969. Vegetation Changes in Southern New Mexico During the Past Hundred Years. In: Arid Lands in Perspective. Editors: William G. McGinnies and Bram J. Goldman. University of Arizona Press. Tucson. pp. 157-166.

Zarn, Mark; Heller, Thomas; and Collins, Kay. 1977. Wild, Free-Roaming Horses - Status of Present Knowledge. USDI, BLM. USDA, USFS. T/N 294. 72 p.



☆ U.S. Government Printing Office: 1979-678-527 Region 8

Bureau of Land Management
Library
Denver Service Center

Form 1279-3
(June 1984)

BORROWER'

SF 85.35 .N6 E222
Draft environment
statement on gra

| DATE LOANED | BORROWER |
|---|---|
| | |
| | |
| | |

USDI – BLM

Bureau of Land Management
Library
Denver Service Center

# UNITED STATES DEPARTMENT OF THE INTERIOR
# BUREAU OF LAND MANAGEMENT

SOCORRO DISTRICT OFFICE SOCORRO, NEW MEXICO

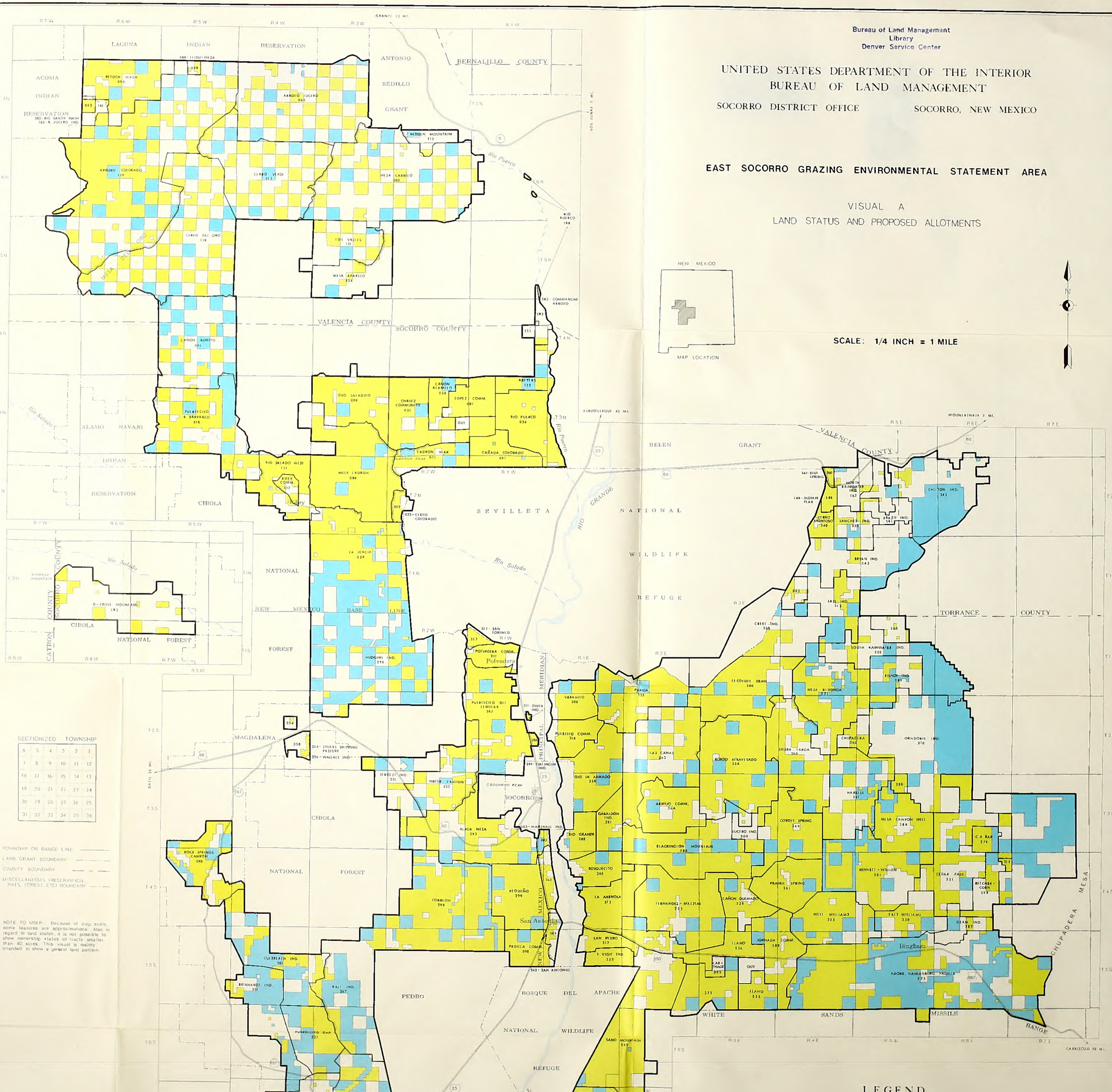
## EAST SOCORRO GRAZING ENVIRONMENTAL STATEMENT AREA

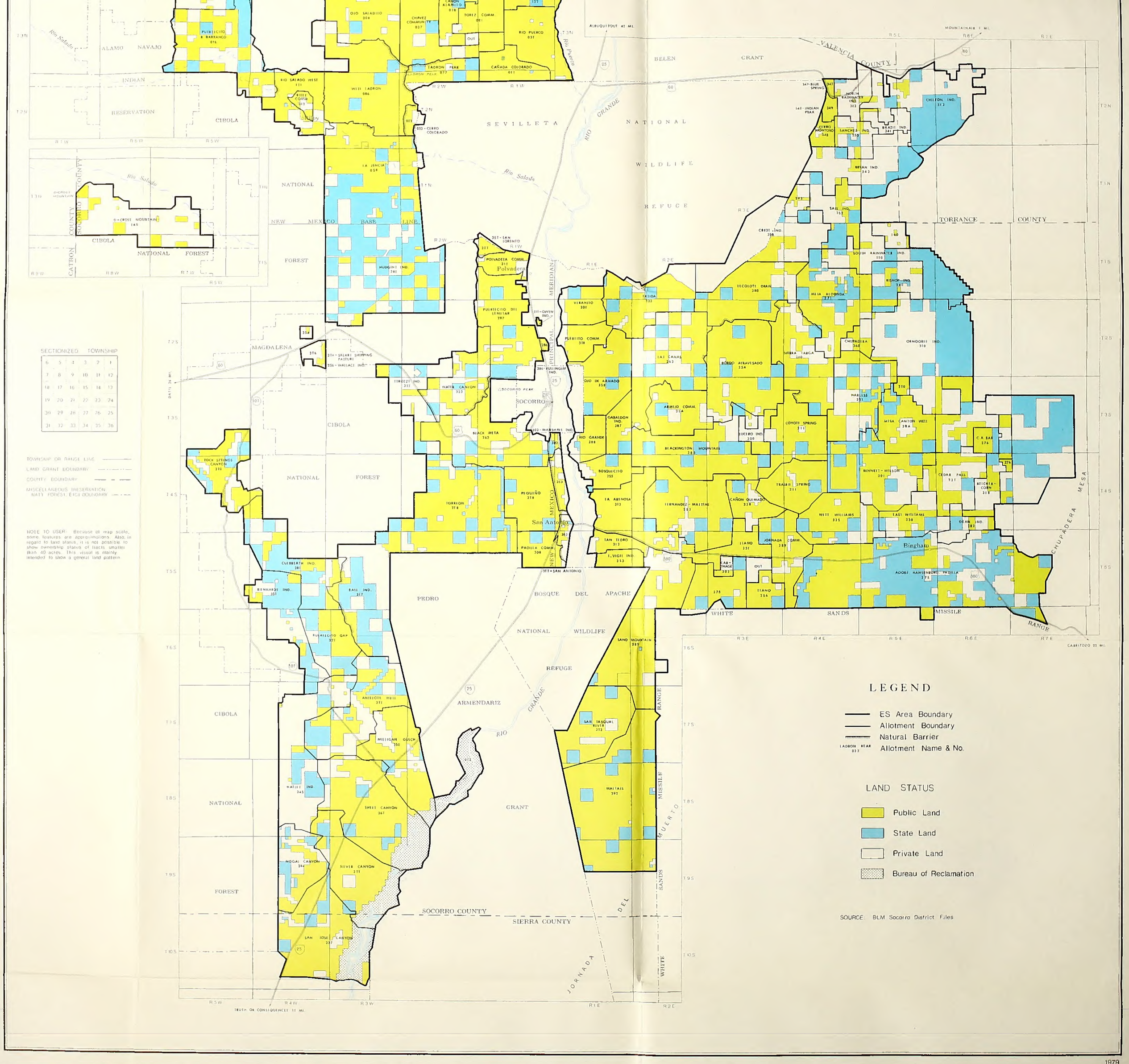
VISUAL A

LAND STATUS AND PROPOSED ALLOTMENTS




SCALE: 1/4 INCH = 1 MILE






1979

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-779-454

Bureau of Land Management
Library
Denver Service Center

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

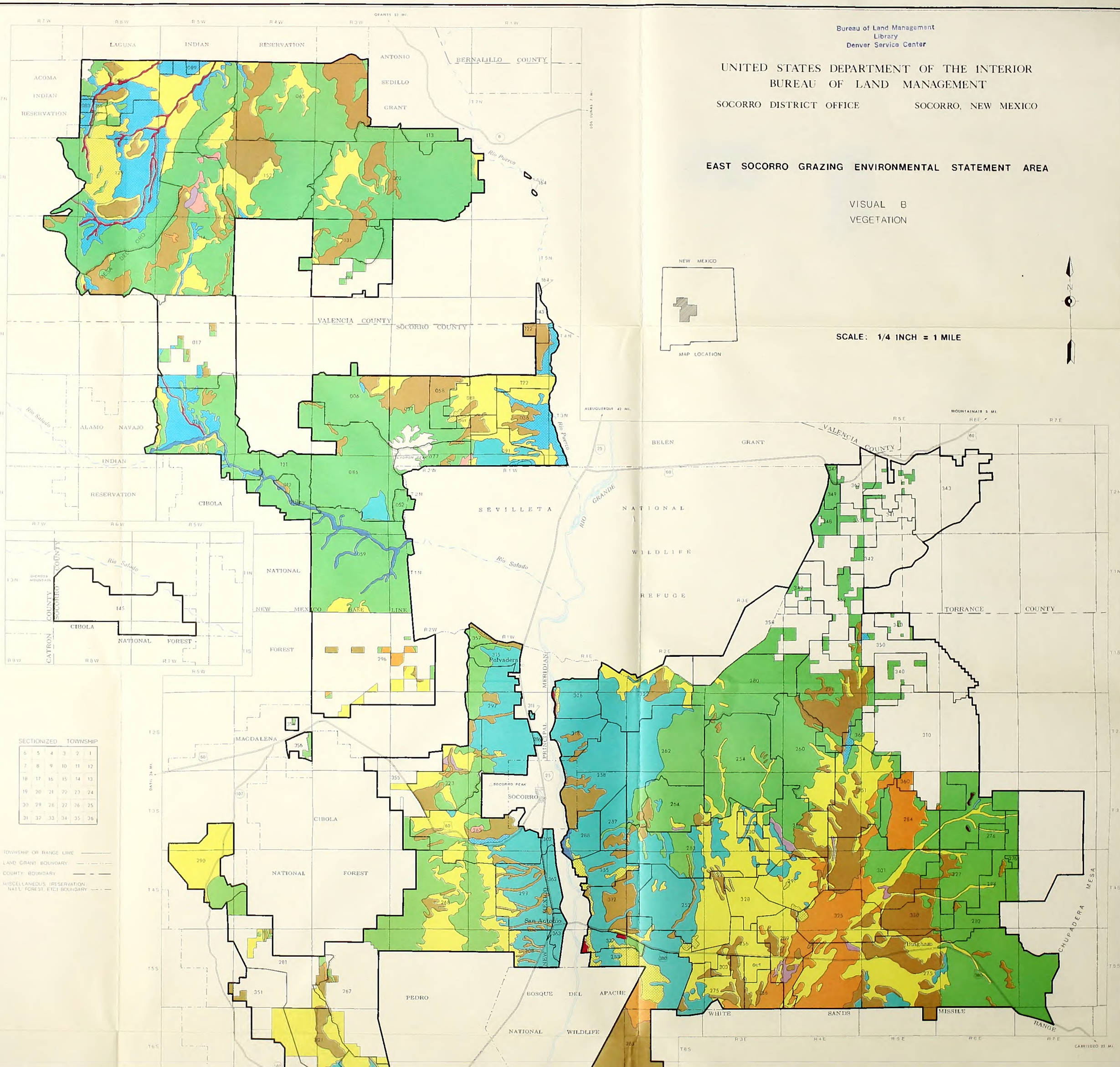
SOCORRO DISTRICT OFFICE SOCORRO, NEW MEXICO

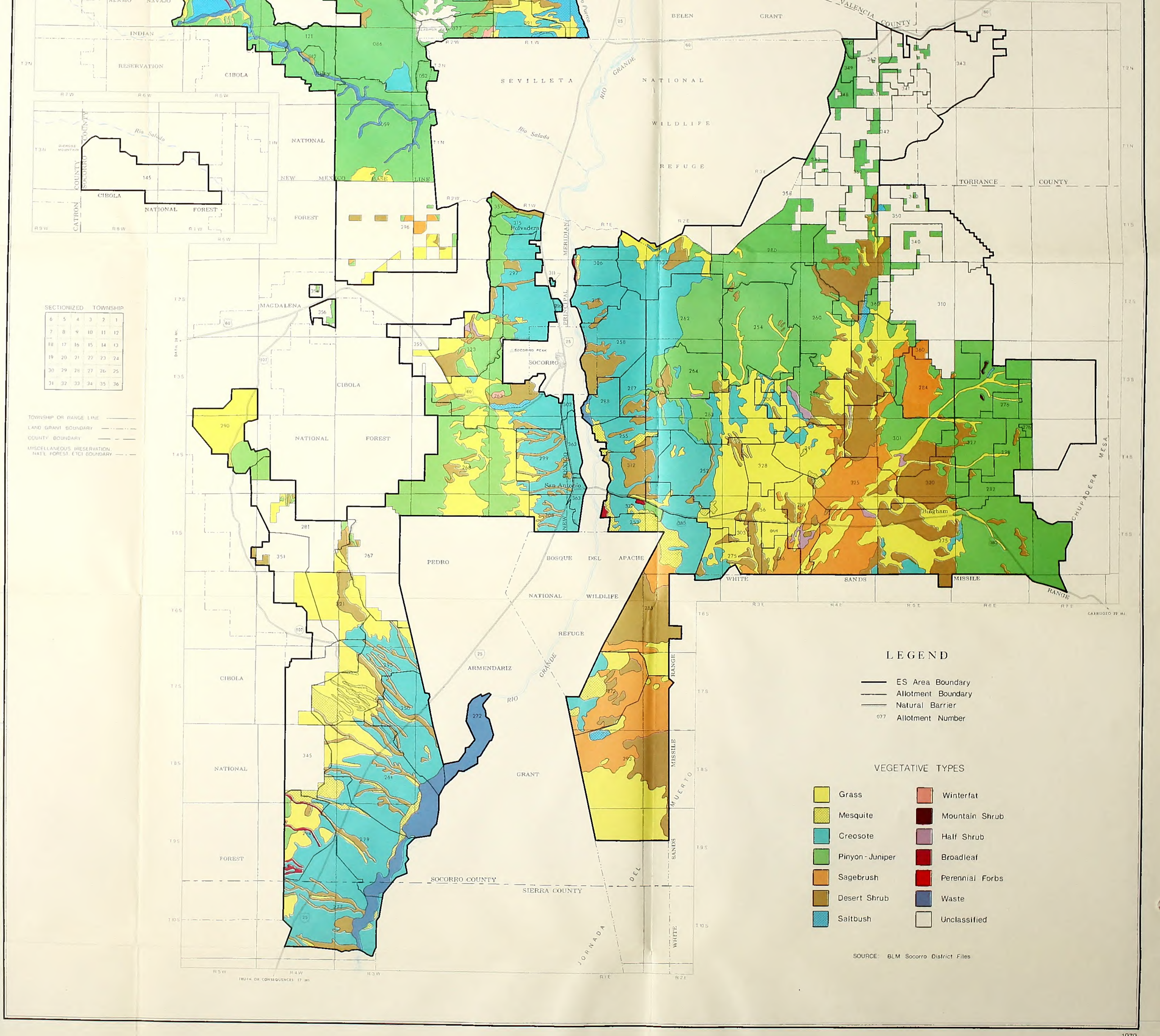
# EAST SOCORRO GRAZING ENVIRONMENTAL STATEMENT AREA

VISUAL B
VEGETATION




SCALE: 1/4 INCH = 1 MILE






1979

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-779-454

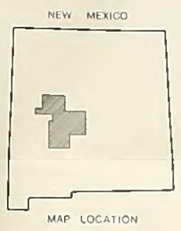
Bureau of Land Management
Library
Denver Service Center

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SOCORRO DISTRICT OFFICE SOCORRO, NEW MEXICO

# EAST SOCORRO GRAZING ENVIRONMENTAL STATEMENT AREA

VISUAL C
SOILS

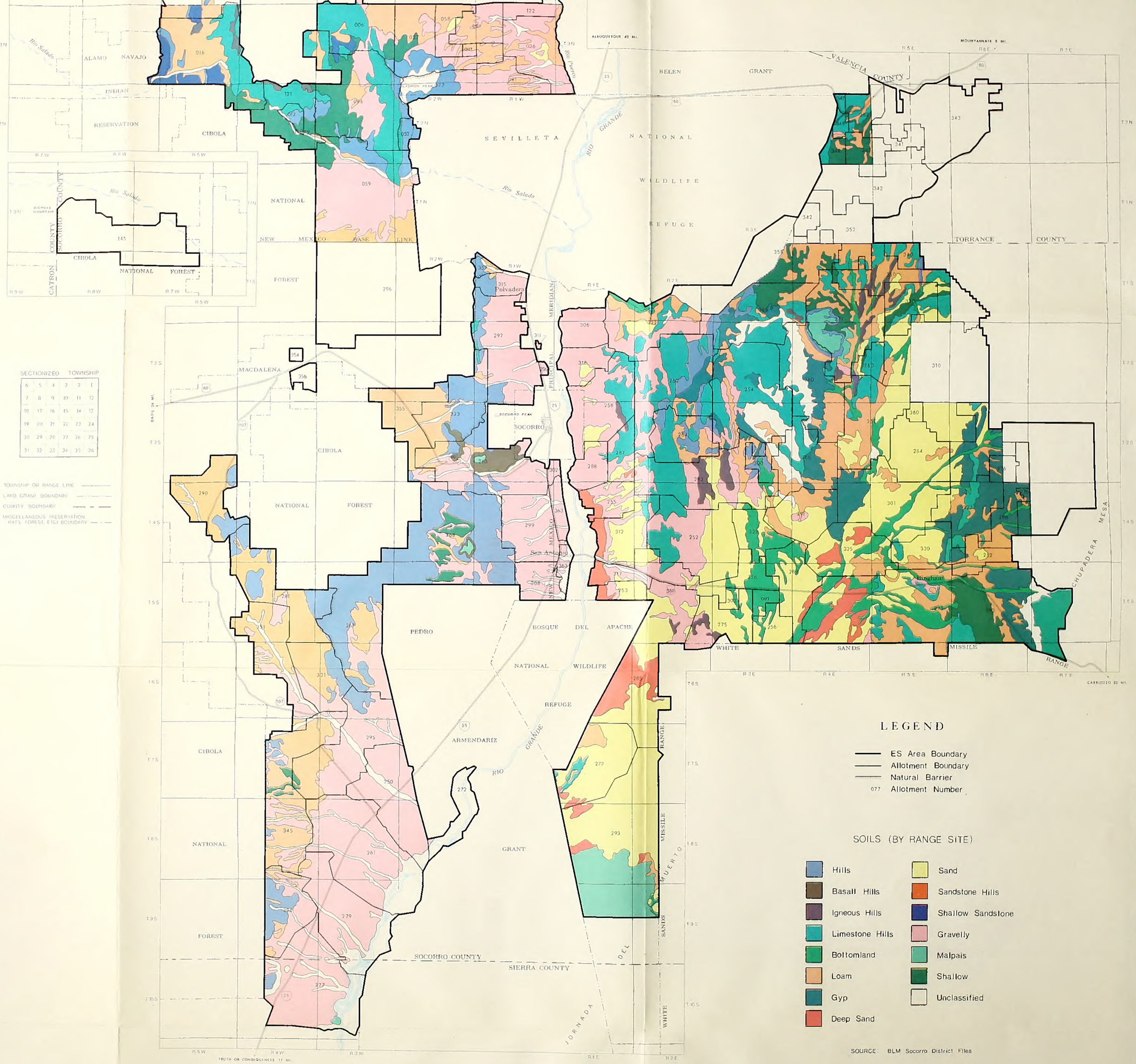



SCALE: 1/4 INCH = 1 MILE

LAGUNA INDIAN RESERVATION
ACOMA INDIAN RESERVATION
ANTONIO SEDILLO GRANT
BERNALILLO COUNTY
VALENCIA COUNTY
SOCORRO COUNTY
ALAMO NAVAJO INDIAN RESERVATION
CIBOLA NATIONAL FOREST
SEVILLETA NATIONAL WILDLIFE REFUGE
BELEN GRANT
TORRANCE COUNTY
MAGDALENA
SOCORRO
Polvadera
San Antonio
Bingham
PEDRO ARMENDARIZ
BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE
WHITE SANDS MISSILE RANGE
CHUPADERA MESA
MESA DEL ORO
Rio Salado
Rio Puerco
RIO GRANDE
NEW MEXICO BASE LINE
NEW MEXICO PRINCIPAL MERIDIAN
SECTIONIZED TOWNSHIP
TOWNSHIP OR RANGE LINE
LAND GRANT BOUNDARY
COUNTY BOUNDARY
MISCELLANEOUS (RESERVATION, NATL. FOREST, ETC) BOUNDARY

## LEGEND

ES Area Boundary




1979

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-779-454

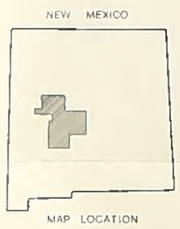
Bureau of Land Management
Library
Denver Service Center

UNITED STATES DEPARTMENT OF THE INTERIOR
BUREAU OF LAND MANAGEMENT

SOCORRO DISTRICT OFFICE SOCORRO, NEW MEXICO

# EAST SOCORRO GRAZING ENVIRONMENTAL STATEMENT AREA

## VISUAL D
## EXISTING AND PROPOSED DEVELOPMENTS



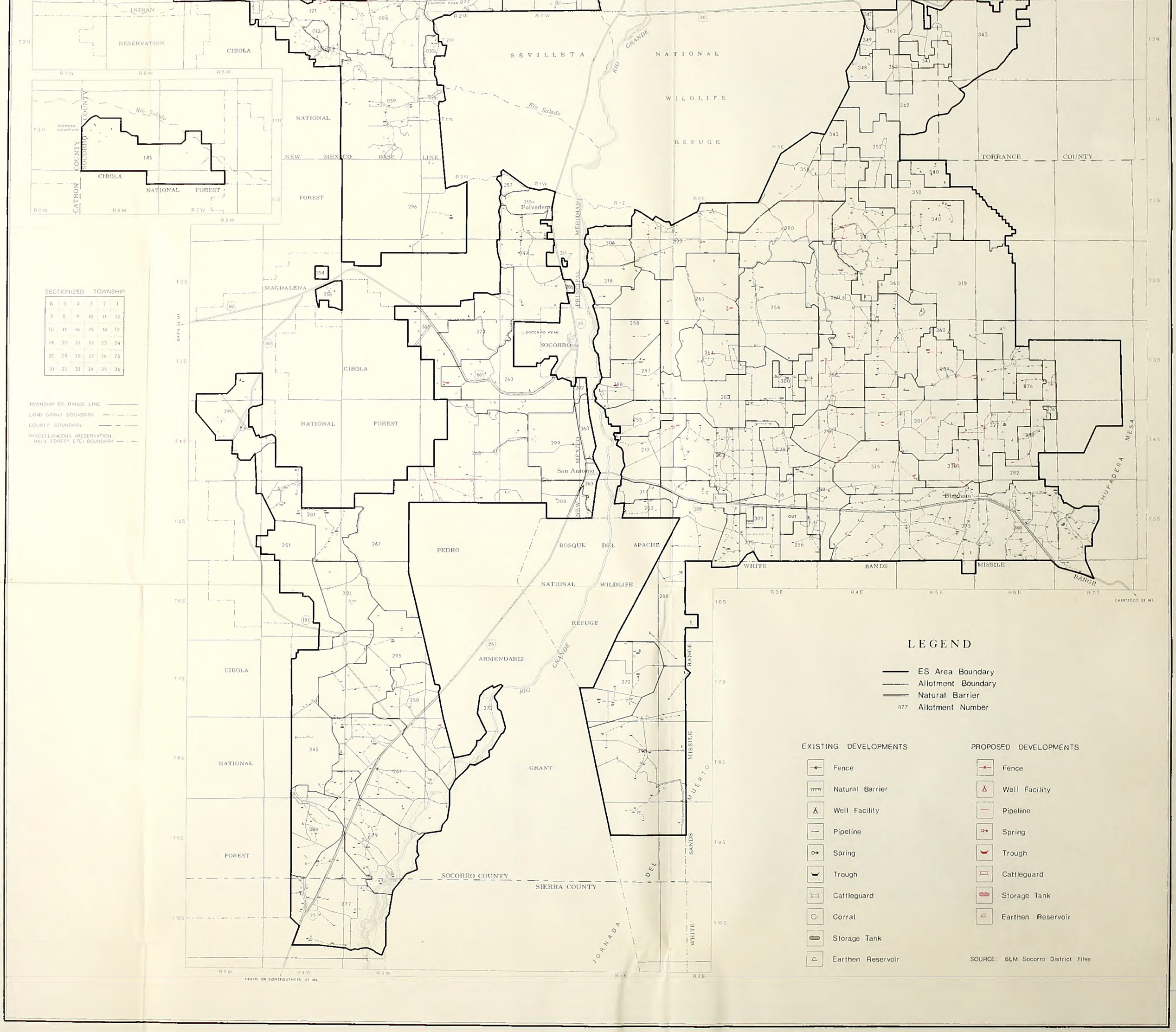

SCALE: 1/4 INCH = 1 MILE

SECTIONIZED TOWNSHIP

| | | | | | |
|---|---|---|---|---|---|
| 6 | 5 | 4 | 3 | 2 | 1 |
| 7 | 8 | 9 | 10 | 11 | 12 |
| 18 | 17 | 16 | 15 | 14 | 13 |
| 19 | 20 | 21 | 22 | 23 | 24 |
| 30 | 29 | 28 | 27 | 26 | 25 |
| 31 | 32 | 33 | 34 | 35 | 36 |

TOWNSHIP OR RANGE LINE
LAND GRANT BOUNDARY
COUNTY BOUNDARY
MISCELLANEOUS (RESERVATION, NAT'L FOREST, ETC) BOUNDARY

LAGUNA INDIAN RESERVATION
ACOMA INDIAN RESERVATION
ANTONIO SEDILLO GRANT
BERNALILLO COUNTY
VALENCIA COUNTY
SOCORRO COUNTY
ALAMO NAVAJO INDIAN RESERVATION
CIBOLA NATIONAL FOREST
SEVILLETA NATIONAL WILDLIFE REFUGE
BELEN GRANT
TORRANCE COUNTY
MAGDALENA
SOCORRO
San Antonio
Polvadera
Bingham
PEDRO
BOSQUE DEL APACHE NATIONAL WILDLIFE REFUGE
WHITE SANDS MISSILE RANGE
CHUPADERA MESA
MESA DEL ORO
Rio Puerco
Rio Salado
Rio Grande
NEW MEXICO PRINCIPAL MERIDIAN
NEW MEXICO BASE LINE
SOCORRO COUNTY
CATRON COUNTY
CIBOLA NATIONAL FOREST




1979

☆ U.S. GOVERNMENT PRINTING OFFICE: 1978-779-454